POPULAR Computing WEEKLY

35p 14-20 April 1983 Vol 2 No 15

This Week

Business software

Tony Bridge looks at a range of business programs designed for the Spectrum owner and decides whether or not they are value for money See page 14

Dragon 3-D graphics

Joseph Burr presents a program to draw a three-dimensional view of any mathematical formula on page 27

Blind Alley

£10 prize to be won each month in our new competition Can you beat the new high score? Find out the answer on page 37

Vic programming

James Brennan explains how to obtain a printed copy of the Vic20's hi-res screen See page 23

STAR GAME

Defender on Spectrum. See page 10.

News Desk

Timex sit-in over cuts

OVER 100 workers at Timex's Dundee plant have begun a sit-in following the announcement of plans to make 200 compulsory redundancies

The sit-in began after work finished at the company's Milton works last Friday — immediately before the plant's week long Easter holiday

In January, Timex announced its intention to cut the workforce at Dundee by 1,900 So far 1 700 employees have taken voluntary redundancy

Milton is one of two Timex plants in Dundee and is the proposed site for manufacture of the Sinclair flat screen tv Sinclair computers are made at Camberdown, which has so far been unaffected by the industrial action

Timex has already established a pilot production line at Milton for the £50 tv, due to be launched in the autumn

"It is all a little unreal at the moment, because if they weren't sitting-in they would be on holiday," commented a Sinclair spokesman A lot de

Continued on page 5

BBC disc snags!

ACORN'S BBC disc drives look like running into trouble

The main chip used in the disc interface unit — the Intel 8271 — is now in very short supply This in turn is limiting production of the interface itself

Many Acorn dealers now have no disc interfaces to sell and schools are experiencing lengthening delivery times for the disc drive units

'World wide demand for the 8271 chip has gone through the roof,' said an Intel spokesman

'We are out of stock ourselves and not even Intel in the States can supply any And the situation is not likely to improve until at least the middle of the year '

A further complication is that it is not clear for how long Intel will continue to manufacture the chip The 8271 disc controller device has now been on sale for over three years and has been superseded by other chips, such as the Intel 8272

Colin Malone of BBC Enterprises commented, "I am certainly aware that there has

Continued on page 5



Continued on page 33


WINDOW ON ANOTHER WORLD
Cruise through the deepest reaches of space in a life and death struggle to decide the fate of the galaxy Match wits with mighty mages in the final battle for supremacy of the planet Xarg Test your driving skills on the tracks at Monte Carlo and Monza Or just relax on a Sunday afternoon with a round or two at your local golf course
Salamander Software offers a wide range of games for the Dragon 32 BBC Model B and Tandy 32K microcomputers. Whatever your age whatever your taste Salamander Software has the program for you! See us at the Midland Computer Fair Birmingham April 28 30
"Why can't all software come up to this standard?"
Computer and Video Games
DRAGON 32 and TANDY 32K
Dragon Trek £9 95
Wizard War £7 95
Golf £7 95 Grand Prix £7 95
Vulcan Noughts and Crosses £7 95
Games Compendium D1 £7 95
BBC MODEL B
Dragon Rider £7 95
Tanks! £7 95
Games Compendium B1 £9 95
Games Compendium B3 £9 95
EDG Graphics Package £24 95
PLEASE ADD 90p P&P TO ALL ORDERS
Cheques or postal orders payable to
SALAMANDER SOFTWARE Dept C
27 Ditchling Rise Brighton East Sussex BN1 4QL
Tel 0273 771942
Send SAE for a full Catalogue
Programmers wanted good royalties paid!
Salamander Software



14-20 April 1983 Vol 2 No 15

SUNSHINE

The Team

Popular Computing Weekly
Hobhouse Court 19 Whitcomb Street,
London WC2 7HF
Telephone **01-839 6835**
Published by Sunshine Publications Ltd
Typesetting origination and printing by Chesham Press Chesham Bucks
Distributed by S M Distribution
London SW9 01-274 8611 Telex 261643

Subscriptions
You can have *Popular Computing Weekly* sent to your home

UK Addresses

26 issues	£9 98
52 issues	£19 95

Overseas Addresses

26 issues	£18 70
52 issues	£37 40

How to submit articles
Articles which are submitted for publication should not be more than 3 000 words long. The articles and any accompanying programs, should be original. It is breaking the law of copyright to copy programs out of other magazines and submit them here — so please do not be tempted.

All submissions should be typed and a double space should be left between each line. Please leave wide margins.

Programs should, whenever possible, be computer printed.

We cannot guarantee to return every submitted article or program so please keep a copy. If you want to have your program returned you must include a stamped addressed envelope.

Accuracy
Popular Computing Weekly cannot accept any responsibility for any errors in programs we publish, although we will always try our best to make sure programs work.

This Week

News 5
BBC discs, Texet TX8000

Letters 7
Buying compilers

Defender 19
A new game for the 48K Spectrum by Michael Levers

Reviews 14
Tony Bridge assesses a range of business programs for the Spectrum

Spectrum 20
Accounts program by S. Brown

Programming 23
Vic20 hi-res graphics screen print by James Brennan

BBC in education 24
Histograms by Boris Allan

Dragon 27
3D graphics by Joseph Burr

Open Forum 29
Five pages of your programs

Adventure 37
Tony Bridge s adventure corner

Peek & poke 42
Your questions answered

Competitions 43
Puzzle, Top 10, Ziggurat, Losers

Editorial

The Software Centre's Buy 'n Try scheme (*Popular Computing Weekly*, 24-30 March) has been the subject of some controversy in recent weeks.

Proponents of the scheme — under which customers can return programs within one month of sale and receive a discount of 80 percent towards subsequent purchases — argue that it will benefit both the consumer and the software industry by increasing overall sales. Those opposed to the Software Centre plan fear that it will damage the industry, making it uneconomic to produce new games.

Legal action over the scheme by Quicksilva has been dropped in return for certain safeguards, including a reduction in the buy-back time from six months to one month. Other software houses opposed to the Buy 'n Try scheme appear to have accepted that they have no legal grounds for stopping it.

Most software companies seem to be adopting a 'Wait and see' approach, although some firms, such as *Commodore*, are actively looking for alternatives, including moving into Rom software. Other companies are reviewing their conditions of sale.

Early indications are that the Software Centre has been extremely busy since it first opened last month. Like it or not, it appears that we will have to learn to live with the Buy 'n Try scheme — it is not going to disappear.

Next Thursday

Can you fly your spacecraft through hordes of enemy aliens? Can you dodge the walls? Find out next week in Searcher, a new game for the 48K Spectrum by Andrew Filby.

BBC discs

Continued from page 1

been some criticism of Acorn for using a chip that is coming to the end of its life-cycle "

If Intel were to stop manufacture of the device one solution would be for Acorn to persuade the company to produce a special run of the chip, specifically for use in the BBC machine Such a move would put up the unit-cost of the chip quite considerably

Although Acorn's joint Managing Director Hermann Hauser commented "We do not see delivery of the 8271 chip causing any production problems at this time," this is not entirely borne out by shortfalls at the dealers

Acorn's David Bell, in charge of BBC liaison, said "There are some concerns with regard to the supply of the 8271 " However, he was confident that any price increase in the chip from Intel would not affect the fixed price to the consumer of £97

"Obviously we are looking at alternative chips — we are doing that all the time," he said

"But all of the other disc controller chips — including the Intel 8272 — have substantially different operating systems Any change to an 8272 would require a substantial reconfiguration of the surrounding circuitry

"I think that we would be reluctant to do that — it would pose problems of compatibility with the existing system "

Meanwhile it looks as if those wanting to buy the disc interface are in for a long wait — at least until June

Timex sit-in

Continued from page 1

pends on how the action develops when the other workers return after the holiday

At this stage it is most unlikely that computer production will be affected But, if the action at the Milton plant continues, then it will progressively put back our plans for the tv which are now at a fairly crucial stage "

● IF you reckon you have a "dazzling" career record — including management success in the electronics business — then Clive Sinclair is offering an exciting new job opportunity

He is looking for an "exceptional" person to become the managing director of a new company that will launch his £50 flat-screen tv in the autumn

Cambridge Recruitment Consultants, who have been given the task of finding such a candidate describe the new post as "the job of a decade" The successful applicant will probably be under 45 and will be looking for a salary of at least £40 000 pa

Lack of response cancels show

THE Scottish Personal Computer World Show, planned for the end of April, has been cancelled

Lack of exhibitor response was blamed for the decision to abandon the exhibition which was to have been held on April 16-18 at the MacRobert Pavilion, Ingleston, Edinburgh

Happy hols!



WITH the warm weather almost here now is the time to plan your computer holiday

Two companies offer such an experience – Dolphin Activity Holidays and Beaumont Summer Camps Both offer either residential or day camps between July and September Prices vary from around £90 for a week at a day camp to between £120 and £160 for a week with full board Dolphin use Sinclair, Acorn and Apple machines, and Beaumont use predominantly Commodore computers

More details from Dolphin 68 Churchway, London NW1 and Beaumont, 73 Upper Richmond Road, London SW15

Digitised Images

MICROEYE is a new low-cost vision analysis device that can be used with a range of microcomputers

The package, developed by Digithurst, enables prerecorded images from a conventional video recorder to be digitised and transferred to a microcomputer

At present the device is configured for use with the BBC Model B machine, but it can also be connected to Commodore, Apple, Research Machines, Hewlett Packard and IBM computers

Pictures are digitised with a 256 × 256 resolution Although, in the BBC implementation, only a 128 × 128 pixel format is used the extra resolution could be extracted using a second processor

Microeye is supplied complete with the necessary interfaces and cables from the video recorder to the computer Software included allows the captured image to be dumped to a printer or disc Images dumped on to disc can then be retrieved for further processing

The complete package will sell for only £340 including VAT Contact Digithurst, Leaden Hill, Orwell, Royston, Herts

Texet changes hands again!

THE future of the Texet TX8000 £98 colour computer is still to be decided after a change of ownership

The original Texet company, Texet Ltd, was put in the hands of the receivers three weeks ago and all the assets of the company have been acquired by a new company, Texet Sales Ltd, set up by Hira Ltd, a Manchester-based import/export company.

Peter Richardson, one of two partners who set up the original Texet company, has been retained by the new owners as managing director of Texet Sales

The original Texet company negotiated an exclusive UK distribution agreement with the computer's Hong Kong manufacturers, Video Technology

The 8K TX8000 is only one of a range of computers being produced by Video Technology — 4K and 16K machines are also being manufactured

Atari agrees with Visicalc

IN a new series of licencing agreements, Atari has reached agreement with the Visicalc corporation to put a version of the Visicalc word processing package on to the Atari 800 and 1200XL machines

In a separate agreement, Atari has licenced Logo for the two machines

Recalled recorders

ACORN has had to recall 3,600 cassette recorders supplied with its machines under the Department of Industry's Micros in Primaries scheme

Pressing the *Play* or *Rewind* button on the BBC Data Recorder while a program was being *loaded* produced a 'click' on the tape This was often sufficient to cause the program to crash

The machines made in Hong Kong for Acorn, are now being replaced with modified units Recorders with the design improvement can be identified because they have a white paint spot on the underneath of the casing

Bogus rumours

I wish to quell the recent incorrect rumours about the launch of the Sinclair Microdrives. When the Spectrum was launched in April last year, the Microdrives were said to be 'coming soon'. Then they were to be available 'at the end of the year' (1982), and now it is claimed 'in the early part of 1983'. These are all, of course, not true.

A contact working for Sinclair tells me that 'maybe' there will be a few ready for magazine reviews by 'about June' — there will obviously be none available to us Spectrum owners for at least another month from then, not including the statutory two-month waiting time for all new Sinclair products!

The Advertising Standards Authority should again be contacted about Sinclair's advertisements, not only for the 'coming soon' Microdrives but also because they still claim 256×192 pixels, when only 256×176 are addressable from Basic.

Andrew Pennell
14 Sweyn Road
Cliftonville
Kent CT9 2DH

Please help me!

I wonder if you or any of your readers could help me! I would like to know if there is a word processor on sale which will support right justification; and proportional, condensed, and elongated print.

I have a BBC Model 'B' Microcomputer, and a Centronics 739 printer. If possible, I would prefer to pay no more than £50 for the processor.

Andrew Bede
94 Westwood Road
Leek
Staffs ST13 8DL

Do's and don'ts

In addition to P Finn's comments on copyright (*Popular Computing Weekly*, April 7-13), which I am in full agreement with, I would like to offer this advice to all purchasers (potential or otherwise) of compilers.

1) *Potential purchasers*
If you are considering purchasing a compiler for your micro please ensure that the product for sale is:
— Not purely a naive converter
— can handle *all* Basic functions available on your micro
— not integer based

It is my opinion that no such compiler currently exists for the Spectrum and those that are for sale fall far short of the "basics" stated above.

2) *Purchasers*
If you have purchased a compiler, *do* not, I repeat, *do not* be fooled into thinking you must pay the company you purchased the compiler from any kind of royalty.

It is not enough that you have paid the company money in return for a product, that you are now told the you *must* pay further monies should you wish to market your own developed software? Sheer greed and stupidity on the company's part I would say.

No doubt my comments will upset a few companies — alternatively it might bring them to their senses. However, let me state now that should I develop software and subsequently market the same and if during 'my hard work' I used such tools as a compiler, then under no circumstances will I pay or recognise any form of royalty. If that upsets *you, "Mr Company"*, then I am more than willing to fight.

So come on all you companies out there, let's try to put some professionalism into the micro industry and take out any sharp practices.

O M Jackson
2 Sefton Gardens
Aughton Green
Ormskirk
Lancs L39 6RZ

Twenty Ones debugged

My apologies to all who tried to run *Twenty Ones* (*Popular Computing Weekly*, March 31). I made some bad mistakes that were overlooked in proof reading. The following should put things right.

Lines 38 and 48 require commas after 135 and 172
Lines 590 560 470 require a colon before *Return*
Line 530 requires a semi-colon after GT
Line 500 requires a comma after 32
Line 650 requires an open quote
Lines 620 630 590 require an = after ZZ$

```
1150 PLAY"P1":CLS:PRINT @ 232, "YOU BUST":GG = GG - G
1160 GOTO 70
1200 PLAY"P1P1":CLS:PRINT @ 256,"YOU WIN";G*3;"£":GG = GG + (G*2)
1210 GOTO 70
```


John Jackaman
61 Kathleen Ferrier Crescent
Laindon
Basildon
Essex SS15 5QX

Modified apology!

The program *Reconfiguration*, which you published on my behalf (*Popular Computing Weekly*, March 10-16), is a slightly modified version of one published by Mike Todd in the September 1982 issue of the newsletter of the Independent Commodore Products User Group. I would like to apologise for any embarrassment caused to Mike Todd, ICPUG and *Popular Computing Weekly*.

Peter Wilson
26 North Cape Walk
Corby
Northants NN18 9DQ

No reply from Acorn

Can you tell me if Acorn Computers is still in business? I am trying to get my BBC micro A upgraded to a B. Acorn's local agents say that they cannot get supplies and letters written directly to Acorn are not acknowledged. Why is this?

John Andrews
7 Priory Road
Dawlish
South Devon

Acorn is very much in business. Unfortunately, like many other micro manufacturers, Acorn does not always answer its correspondence promptly. If you cannot get any reply to your letters, I would suggest telephoning Acorn direct.

Gobbling up space!

Now that we have micros like the Dragon 32 offering us a good amount of user Ram for a fair price, it appears that people are very keen on gobbling up as much space as they can without a thought to how inefficient their programs might be. A good example is a program called *Board Game* published in *Popular Computing Weekly*, 27 January-2 February. Lines 550 to 740 read:

```
550 A$ = INKEY$
560 IF A$ = "X" THEN 10
570 IF A$ = "1" THEN C = 25:F1 = 1
580 IF A$ = "2" THEN C = 45:F1 = 1
590 IF A$ = "3" THEN C = 65:F1 = 1
600 IF A$ = "4" THEN C = 85:F1 = 1
610 IF A$ = "5" THEN C = 105:F1 = 1
620 IF A$ = "6" THEN C = 125:F1 = 1
630 IF A$ = "7" THEN C = 145:F1 = 1
640 IF A$ = "A" THEN D = 25:F2 = 1
650 IF A$ = "B" THEN D = 45:F2 = 1
660 IF A$ = "C" THEN D = 65:F2 = 1
670 IF A$ = "D" THEN D = 85:F2 = 1
680 IF A$ = "E" THEN D = 105:F2 = 1
690 IF A$ = "F" THEN D = 125:F2 = 1
700 IF A$ = "G" THEN D = 145:F2 = 1
710 IF A$ = "H" THEN D = 165:F2 = 1
720 IF A$ = "I" THEN D = 185:F2 = 1
730 IF A$ = "J" THEN D = 205:F2 = 1
740 IF A$ = "K" THEN D = 225:F2 = 1
```

By using a simple table, the 18 (!) conditional statements could be replaced with the following:

```
550 A$ = INKEY$:IF A$ = "" THEN 550
560 IF A$ = "X" THEN 10
570 IF ASC(A$) > 48 AND ASC(A$) < 56 THEN C = TABLE(ASC(A$)):F1 = 1
580 IF ASC(A$) > 64 AND ASC(A$) < 76 THEN D = TABLE(ASC(A$)):F2 = 1
```

The only extra code required is to initialise the table at the beginning of a run. This could appear as a subroutine:

```
1000 DIM TABLE(75)
1010 DATA 25,45,65,85,105,125,145,165,185,205,225
1020 FOR A = 49 TO 55:READ TABLE(A):NEXT:RESTORE
1030 FOR A = 65 TO 75:READ TABLE(A):NEXT
1040 RETURN
```

This makes much more efficient use of both the interpreter and processor. Of course, this is not the only use for tables, but I hope it has given an insight into how the problem of testing for many conditions may be solved.

C Whitehead
63 All Saints Avenue
Westbrook
Margate
Kent CT9 5QJ

What the experts say:

Sinclair User "QUALITY"

•USE AND LEARN

Sinclair User "EXCELLENT"

What Micro "TREMENDOUSLY VALUABLE ... GET THE BEST OUT OF SPECTRUM BASIC"

ZX Computing "EXCELLENT ... A GREAT ASSET ... FANTASTIC VALUE ... VERY HIGHLY RECOMMENDED"

•THE DATABASE

Sinclair User "EXCELLENT"

•THE SPREADSHEET

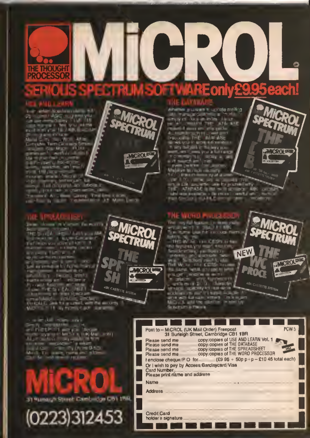
Personal Computer News "EASY TO USE ... PLENTY OF USES ... STREETS AHEAD OF GEMINI'S SPREADSHEET"

Sinclair User "EXCELLENT ... MUCH CLEVERER THAN VU-CALC"

What Micro "QUALITY"

MiCROL

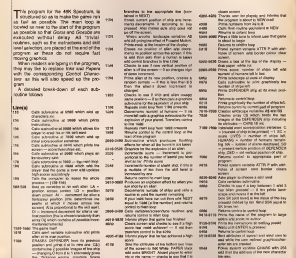
Not available in any Store - Order TODAY for fast convenient delivery



THE THOUGHT PROCESSOR
MiCROL
SERIOUS SPECTRUM SOFTWARE only £9.95 each!
USE AND LEARN
THE DATABASE
THE SPREADSHEET
THE WORD PROCESSOR
MiCROL SPECTRUM
NEW
Post to – MiCROL (UK Mail Order) Freepost
31 Burleigh Street, Cambridge CB1 1BR
PCW 5
Please send me copy/copies of USE AND LEARN Vol. 1
Please send me copy/copies of THE DATABASE
Please send me copy/copies of THE SPREADSHEET
Please send me copy/copies of THE WORD PROCESSOR
I enclose cheque/P O for (£9 95 + 50p p+p – £10 45 total each)
Or I wish to pay by Access/Barclaycard/Visa
Card Number
Please print name and address
Name
Address
Credit Card holder s signature
MiCROL
(0223)312453

Defender

A new game for the 48K Spectrum by Michael Levers



This program for the 48K Spectrum, is structured so as to make the game run as fast as possible. The main loop is located as near to the start of the program as possible so that *Gotos* and *Gosubs* are executed without delay. All 'trivial' routines, such as the instructions and skill level selection, are placed at the end of the program as these do not require fast moving graphics.

When readers are typing in the program, they may like to replace *Inks* and *Papers* with the corresponding *Control Characters* as this will also speed up the program.

A detailed break-down of each subroutine follows.

Line(s)	
10	Calls subroutine at 9500 which sets up characters etc.
20	Calls subroutine at 9000 which prints instructions.
30	Calls subroutine at 8000 which allows the player to enter his or her skill level
40	Calls subroutine at 7000 which sets up initial score/position variables
50	Calls subroutine at 6010 which prints the screen — score/lives/ships etc.
60	Calls subroutine at 5000 which plays an introductory tune
70	Calls subroutine at 1000 — the main loop
80	Calls subroutine at 4000 which tells the player that the game is over and updates high scores accordingly
90	Tells the computer to repeat the whole process — (30-80)
500-590	Sets up variables to do with alien. LA = position across screen. LD = position down screen. AI — decrement for alien's horizontal position (this determines the speed at which it moves across the screen). AI is proportional to the skill level. DI = increment/decrement for alien's vertical position (this is chosen randomly from array D() which contains all possible increments/decrements)
1000-1600	The game itself
1010	Calls alien variable subroutine and prints alien at its start position.
1100	ERASES DEFENDER from its previous position and prints it at its new one. C$() contains the 2 possible images of the ship — changing C from 0 to 1 alternately gives the 'flickering engine' graphics. Scans keyboard — if fire button pressed and the alien is in front of you then a 'laser bolt' is printed in front of your ship and then erased — if your position is the same as the alien's (down the screen) then a graphics subroutine is called
1110	Creates a random number — if this is less than your skill level divided by ten and the alien is in front of you then a 'laser bolt' is printed in front of the alien — essentially the lander is firing at you. The bolt is then erased and if the alien's vertical position is the same as yours then a graphics subroutine is called which simulates the explosion of your ship. The computer then branches to the appropriate line (contained in NEXT)
1120	Stores current position of ship and increments/decrements it according to key pressed. Also makes sure ship does not go off the screen.
1120	Wraps around landscape variables A$ and B$ giving the effect of Forward Motion. Prints result at the bottom of the display
1130	Erases the position of alien and decrements its position across the screen. If this is less than zero then a human is taken and control branches to line 1200
1140	Checks to see if new vertical position of alien is off the screen — if so changes sign of down increment.
1150	Prints alien at its new position, creates a random number — if this is less than 0.3 then the alien's down increment is changed
1160	Checks to see if ship and alien occupy same position — if so then calls a graphics subroutine for the explosion of your ship
1180	Repeats main loop from 1100 onwards.
1200	Decrements number of humans — if no more left calls a graphics subroutine for the explosion of your planet. Transfers control to line 1600
1210	Repeats main loop from 1000 onwards
1900	Returns control to the control loop at the start of the program
2000-2490	Subroutine which produces flashing effects for when all the humans are taken
2510-2520	Graphics for the explosion of an alien
2530	Increments score — increment is proportional to the number of aliens you have shot so far. Prints score
2540	Increments number of aliens shot. If this is a multiple of ten then the skill level is increased by one
2900	Returns control to main loop
3010-3060	Produces an explosion effect for when you are shot by an alien
3070	Decrements number of ships and calls a routine to print the number remaining
3080	If your lives have run out then sets NEXT equal to 1600 (a line number) and returns control to main loop
3090-3400	Calls variables/screen/tune routines and returns control to main loop
4010-4020	Informs player that game has finished
4030	Clears screen and checks to see if a high score has been achieved — if not then transfers control to line 4260
4035-4100	Informs player that he has achieved a high score
4110	Sets the attributes of the bottom two lines of the screen to INK White PAPER black and extra BRIGHT. Allows player to enter his or her name — checks to see that it is not too long or short.
4120	Updates high score table
4200-4270	Prints the table of high scores
4280-4290	Makes the word 'DEFENDER' flash in different colours.
4300-4310	Waits for a second then prints a copyright message
4320	Prints on the last line of the screen (using # 0). Asks player if he wants another game
4330	Waits until either the "Y" key is pressed or the "N" key is pressed
4340	Sends control to 4400 if "Y" key pressed
4300	Pokes system variable ATTR P with attributes of screen and border colour and clears screen
4360-4390	Thanks user for playing and informs that the program is about to NEW itself
4300	Prints numbers from 10 to 0
4400	Calls Rom routine equivalent to NEW
4900	Returns to control loop
5000-5060	Plays a little tune to inform user that game is about to begin
5900	Returns to control loop
6010	Pokes system variable ATTR P with attributes of screen and border colour, clears screen.
6020-6030	Draws a bar at the top of the display — blue paper, white ink
6060-6050	Prints score, number of ships left and number of humans left in bar
6060	Prints landscape at end of display
6070	Calls subroutine to print graphically the number of ships left
6080	Prints DEFENDER ship at its start position
6900	Returns to control loop
6210	Prints graphically the number of ships left.
6900	Returns control to correct part of program
7010-7020	Creates landscape variables A$ and B$
7030	Creates array C$ which holds the two images of the DEFENDER ship including its attributes — CHR$ 16 etc
7100-7500	Initialises start score/position variables. C = (number of ship to be printed) −1. SC = score. LIVES = number of ships left. HUMANS = number of humans remaining. NA = number of aliens destroyed. SD = present vertical position of DEFENDER ship. OSD = old vertical position of ship.
7900	Returns control to appropriate part of program
8010	Pokes system variable ATTR P with attributes of screen, sets border, clears screen
8020-8040	Asks player to choose a skill level
8050	Calls variables subroutine
8060	Checks to see if a key between 1 and 5 has been pressed — if so prints landscape and moves it to the left
8070	Sets SK (skill level) to the value of the key pressed divided by ten. Sets SSK equal to SK times ten
8900	Returns control to control loop
9010-9110	Prints the name of the program in large letters and prints its author
9120-9190	Prints the instructions of the game
9190	Waits until ENTER is pressed
9900	Returns to control loop
9510-9530	Sets attributes of screen and asks user to wait while the user defined graphics/character set are created
9540	Pokes system variable CHARS with 256 less than the address of the new character set area.
9550	Copies the data for the normal character set from Rom into Ram (above RAMTOP)
9560-9570	Pokes the data for the "space-age" character set into place overwriting the similar character set in Rom
9580	Pokes in the user defined graphics — aliens, DEFENDER etc
9590-9880	Data for new character set and user defined graphics
9870	Creates high score table
9880	Pokes system variable FLAG2 this turns CAPS SHIFT on
9890	Creates direction array — contains all directions for aliens
9900	Returns control to control loop

DEFENDER

COPYRIGHT 1983 H. J. LEVERS

```
90 CLEAR 63999 REM FOR CHARS
100 [illegible]
110 GO SUB 9500 REM INITIALISE
120 GO SUB 9000 REM INSTRUCT
130 GO SUB 8000 REM SKILL
140 GO SUB 7000 REM VARIABLES
150 GO SUB 6000 REM SCREEN
160 GO SUB 5000 REM PAUSE
170 GO SUB 1000 REM MAIN LOOP
180 GO SUB 4000 REM GAME OVER
190 GO TO 130 REM REPEAT
500 [illegible]
510 LET LA=31 LET LD=INT (RND*14)+5 LET AI=1+INT (RND*3)+(SK>.3)+(SK>.6)+(SK=.8) LET DI=D(INT (RND*8)+1)
590 RETURN
1000 [illegible]
1010 GO SUB 510 PRINT AT LD,LA, INK 5,"
1100 PRINT AT OSD,1," ",AT SD,1,C$(C+1) LET C=NOT C LET I$=INKEY$ IF I$="M" AND LA>3 THEN PRINT AT SD,4,"
" BEEP .004,10 BEEP .004,9 PRINT AT SD,4
" IF SD=LD THEN GO SUB 2500 GO TO 1000
1110 IF RND<SK AND LA>8 THEN PRINT AT LD,4, INK 4,"
"( TO LA-4) BEEP .01,0 PRINT AT LD,4,"
"( TO LA-4) IF LD=SD THEN GO SUB 3000 GO TO NEXT
1120 LET OSD=SD LET SD=SD+2*((I$="Z" AND SD<19)-(I$="1" AND SD>5))
1125 LET B$=B$(2 TO )+B$(1) LET A$=A$(2 TO )+A$(1) PRINT AT 20,0, INK 4,A$,B$
1130 PRINT AT LD,LA," ". LET LA=LA-AI IF LA<0 THEN GO TO 1200
1140 IF LD+DI>18 OR LD+DI<5 THEN LET DI=-DI
1150 LET LD=LD+DI PRINT AT LD,LA, INK 5,"" IF RND<.3 THEN LET DI=D(INT (RND*(6-(2 AND SK<.3)))+1)
1155 IF (LA=2 OR LA=3) AND LD=OSD THEN GO SUB 3000 GO TO NEXT
1160 GO TO 1100
1200 LET HUMANS=HUMANS-1 PRINT AT 2,27,"0"( TO 2-LEN STR$ HUMANS),HUMANS FOR X=20 TO 10 STEP -2 BEEP .005,X NEXT X IF NOT HUMANS THEN GO SUB 2000 GO TO 1900
1210 GO TO 1000
1900 RETURN
2000 [illegible]
2010 PRINT AT OSD,1," " BEEP .1,-27 BEEP .1,-27 BEEP .1,-27 BEEP .4,-29
2020 BEEP .1,-27 BEEP .1,-27 BEEP .1,-27 BEEP .4,-30
2030 PRINT OVER 1, INK 0, PAPER 2, FLASH 1,AT 4,0,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
2040 FOR X=50 TO 0 STEP -5 FOR Y=1 TO 255 STEP 13 OUT 254,Y BEEP .01,Y*2 OUT 254,X NEXT Y NEXT X
2050 PRINT PAPER 0,AT 4,0,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,, OVER 1, INK 4,,,,
2060 LET Z=1 FOR X=1 TO 15 PRINT AT 20,0, INK 4,A$,B$,AT 20,0,,,, PAUSE Z BEEP .01,X BEEP .01,10-X LET Z=Z+1 NEXT X FOR X=50 TO 0 STEP -5 BEEP .01,50-X BEEP .01,X NEXT X
2070 PRINT AT 20,0,,,,
2490 RETURN
2500 [illegible]
2510 FOR Y=1 TO 3 FOR X=1 TO 4 PRINT AT LD,LA, INK X+3,"[illegible]"(X) BEEP .005,X*10+5 NEXT X NEXT Y
2520 PRINT AT LD,LA,"" BEEP .1,-40 PRINT AT LD,LA,
2530 LET SC=SC+10+(20 AND NA>=11)+(30 AND NA>21)+(20 AND NA>=31)+(20 AND NA>=41) PRINT AT 2,6-LEN STR$ SC,SC
2540 LET NA=NA+1 IF NA/10=INT (NA/10) THEN LET SK=SK+(.1 AND SK<.9)
2900 RETURN
3000 [illegible]
3010 PRINT AT SD,1," " FOR X=1 TO 9 PRINT AT SD,2; INK 2,"" BEEP .02,10 PRINT AT SD,2, INK 6, BRIGHT 0,"" BEEP .01,13 NEXT X
3020 PRINT AT SD,2, INK 5;"" BEEP .1,-30
3030 PRINT AT SD,2, INK 4,"" BEEP .1,-40
3040 PRINT AT SD,2, INK 6,"" BEEP .1,-42
3050 PRINT AT SD,0," " BEEP .2,-44
3060 PRINT AT SD,2," " PRINT AT LD,LA,
3070 LET LIVES=LIVES-1 GO SUB 6200
3080 IF NOT LIVES THEN LET NEXT=1900 RETURN
3090 GO SUB 7200 GO SUB 6000 GO SUB 5000 LET NEXT=1000
3900 RETURN
4000 [illegible]
4010 PRINT AT 8,0,, INK 5," GAME OVER",,
4020 FOR X=200 TO -50 STEP -1 BEEP .005,X/3 NEXT X
4030 CLS IF SC<=S(8SK) THEN GO TO 4200
4035 FOR X=0 TO 2 PRINT AT X,0, INK 3," ", INK 4," ", INK 5," " NEXT X
4040 PRINT INK 8,AT 0,0," WELL DONE!!"
4060 FOR X=1 TO 5 FOR Y=20 TO 50 STEP 5 BEEP .01,Y BEEP .01,Y-5 NEXT Y NEXT X
4070 PRINT '' RESTORE FOR X=1 TO 4 READ Y$ FOR Y=1 TO LEN Y$ IF Y$(Y)=" " THEN PRINT " ", GO TO 4090
4080 PRINT PAPER 1,Y$(Y), PAUSE 5
4090 NEXT Y PRINT '' NEXT X
4100 DATA " YOU HAVE QUALIFIED FOR THE"," DEFENDER HALL OF FAME."," PLEASE ENTER YOUR NAME BELOW"," 12 CHARACTERS MAXIMUM PLEASE"
4110 POKE 23624,71 INPUT INK 0,"YOUR NAME ", LINE Y$ IF Y$="" OR LEN Y$>12 THEN BEEP .1,0 GO TO 4110
4190 LET S$(8SK)=Y$ LET S(8SK)=SC
4200 CLS PRINT INK 8,Z$ LET Y$=CHR$ 16+CHR$ 5+"
4210 PRINT INK 6," HALL OF FAME"
4220 PRINT Y$ INK 6" LEVEL PLAYER SCORE "
4230 PRINT Y$
4250 FOR X=1 TO 5 PRINT PRINT " ",X, INK X+2," ",S$(X)," ", INK X+2,"0000"( TO 5-LEN STR$ S(X)),S(X) NEXT X
4260 PRINT Y$
4270 PAUSE 100
4280 FOR X=1 TO 10 FOR Y=1 TO 5 PRINT AT 0,0, INK Y,Z$ NEXT Y NEXT X
4290 PRINT INK 2,AT 0,0,Z$
4300 PAUSE 50
4310 PRINT AT 21,0, INK 3," DEFENDER", INK 5," ©", INK 4," 1983", INK 6," H. J. LEVERS"
4320 PRINT #0,"WOULD YOU LIKE ANOTHER GAME? Y/N"
4330 LET I$=INKEY$ IF I$<>"Y" AND I$<>"N" THEN GO TO 4330
4340 IF I$="Y" THEN GO TO 4900
4350 POKE 23693,15 BORDER 1 CLS
4360 PRINT " THANK YOU FOR PLAYING DEFENDER"
4370 PAUSE 100
4380 PRINT INK 6'" THIS PROGRAM WILL NOW SELF" INK 8'" DESTRUCT"
4390 PRINT AT 10,15, PAPER 0,"90" PAPER 0 PAUSE 100. FOR X=90 TO 0 STEP -1 PRINT AT 10,15,"0"( TO 2-LEN STR$ X),X BEEP .005,X/2 NEXT X
4400 PRINT USR 0
4900 RETURN
5000 [illegible]
5010 BEEP .2,-30 BEEP .2,-26 BEEP .4,-22
5020 BEEP .2,-26 BEEP .2,-22 BEEP .4,-18
5030 BEEP .2,-22 BEEP .2,-18 BEEP .8,-15
5040 PAUSE 60
5900 RETURN
6000 [illegible]
6010 POKE 23693,71 BORDER 0 CLS
6020 PLOT 0,144 DRAW 255,0 DRA
```

Continued on page 13

Continued from page 11

```
W 0,2: DRAW -255,0: DRAW 0,-31
6030 PRINT OVER 1; PAPER 1;AT 0,
0
6040 PAPER 0: PRINT INK 5;AT 1,1
;"SCORE";AT 1,13;"SHIPS";AT 1,25
;"HUMANS"
6050 PRINT AT 2,1;"0000"( TO 5-L
EN STR$ SC);SC;AT 2,2";"0"( TO 2
-LEN STR$ HUMANS);HUMANS
6060 PRINT AT 20,0; INK 4;A$;B$
6070 GO SUB 6200
6080 PRINT AT SC 2 ...      TO )
6090 LET S...
6200 REM [illegible]
6210 PRINT AT 2,12;"         ";A
T 2,12;: FOR X=1 TO LIVES: PRINT
 INK 3;" ";: NEXT X
6900 RETURN
7000 REM [illegible]
7010 LET A$="
7020 LET B$="
7030 DIM C$(2,11): LET C$(1)=CHR
$ 16+CHR$ 3+"<"+CHR$ 16+CHR$ 6+C
HR$ 16+CHR$ 0+" "+CHR$ 16+CHR$
7: LET C$(2)=C$(1,1)+CHR$ 4+"<"+
C$(1,4 TO )
7100 LET C=1: LET SC=0: LET LIVE
S=3: LET HUMANS=15
7110 LET HA=0
7200 LET SD=15: LET OSD=SD
7900 RETURN
8000 REM [illegible]
8010 POKE 23693,40: BORDER 5: CL
S
8020 PRINT "
```

YOUR SELECT

```
8030 PRINT "
```

LEVE :L

```
8040 PRINT   INK 1;" ( 1 - EASI
EST, 5 - HARDEST )"
8050 GO SUB 7000
8060 LET I$=INKEY$: IF I$<"1" OR
 I$>"5" THEN PRINT AT 20,0;A$;B$
: LET A$=A$(32)+A$( TO 31): LET
B$=B$(32)+B$( TO 31): BEEP .001,
20: GO TO 8060
8070 LET SK=VAL I$/10: LET SSK=V
AL I$
8900 RETURN
9000 REM [illegible]
9010 POKE 23693,71: BORDER 0: CL
S
9020 PRINT AT 2,1;"M. J. LEVERS
PRESENTS..."
9030 LET Z$="
```

DEFEN DER

```
9040 PAUSE 100
9050 FOR X=5 TO 20 STEP 3: PRINT
 AT 7,X-1; INK 6;Z$( TO X+2);AT
8,X-1;Z$(X+32 TO X+34);AT 9,X-1
;Z$(X+64 TO X+66): PAUSE 20: NEX
T X
9080 PAUSE 50
9090 FOR X=1 TO 10: FOR Y=1 TO 6
: PRINT AT 7,0; INK Y;Z$: NEXT Y
: NEXT X
9100 PRINT AT 13,4;"FOR THE 48K
ZX SPECTRUM"
9110 PAUSE 150
9120 LET Y$="  YOU ARE IN CONTROL
 OF THE LAST DEFENDER SHIP OF TH
E PLANET     SPECTA. IT IS YOUR
DUTY TO KILL EVIL LANDERS FROM A
 DISTANT     GALAXY WHO TRY TO K
IDNAP HUMANS TO SELL AS SLAVES.

             YOUR SHIP IS EQUIP
PED WITH     POWERFUL LASERS AND
 ION DRIVE TOTHRUST IT FORWARD O
VER THE      MOUNTAINOUS LANDSCA
PE OF SPECTA.YOU MUST DESTROY EA
CH LANDER YOUFIND, IF YOU FAIL T
O DO SO A    HUMAN WILL BE TAKEN
. IF ALL ARE KIDNAPPED YOUR PLAN
ET WILL BLOW UP AND YOU WILL BE
KILLED."
9130 LET Y$=Y$+"
               SHIPS CONTROLS
ARE -
               1 - UP, Z - DOW
N, M - FIRE.
                          GOOD
LUCK!"
9140 POKE 23693,15: BORDER 1: CL
S
9150 FOR X=1 TO LEN Y$: IF Y$(X)
=" " THEN PRINT " ";: GO TO 9170
9160 PRINT Y$(X);: PAUSE 7
9170 NEXT X
9180 PAUSE 100: PRINT #0;" PLEAS
E PRESS ENTER TO CONTINUE"
9190 IF INKEY$<>CHR$ 13 THEN GO
TO 9190
9480 RETURN
9500 REM [illegible]
9510 POKE 23693,71: BORDER 0: PO
KE 23624,71: CLS
9520 PRINT    INK 2;"
```

PLEASE WAIT

```
9530 PRINT INK 6;"WHILE I CREATE
 THE USER GRAPHICS"
9540 POKE 23606,0: POKE 23607,24
9
9550 FOR X=15616 TO 16383: POKE
X+48384,PEEK X: NEXT X
9560 RESTORE 9600: FOR X=64128 T
O 64207: READ Y: POKE X,Y: NEXT
X
9570 FOR X=64264 TO 64471: READ
Y: POKE X,Y: NEXT X
9580 FOR X=USR "A" TO USR "U"+7:
 READ Y: POKE X,Y: NEXT X
9590 REM [illegible]
9600 DATA 0,126,98,114,106,102,1
26,0
9605 DATA 0,56,24,Y,Y,Y,126,0
9610 DATA 0,126,6,126,96,Y,126,0
9615 DATA 0,126,6,126,6,Y,126,0
9620 DATA 0,14,22,38,70,126,6,0
9625 DATA 0,126,96,Y,126,6,126,0
9630 DATA 0,126,96,126,98,Y,126,
0
9635 DATA 0,126,6,6,12,24,48,0
9640 DATA 0,126,98,60,98,Y,126,0
9645 DATA 0,126,70,126,6,70,126,
0
9650 DATA 0,126,98,126,98,Y,Y,0
9655 DATA 0,126,98,124,98,Y,126,
0
9660 DATA 0,126,96,Y,Y,Y,126,0
9665 DATA 0,126,98,Y,Y,Y,126,0
9670 DATA 0,126,96,126,96,Y,126,
0
9675 DATA 0,126,96,126,96,Y,Y,0
9680 DATA 0,126,96,Y,110,98,126,
0
9685 DATA 0,98,Y,126,98,Y,Y,0
9690 DATA 0,24,Y,Y,Y,Y,Y,0
9695 DATA 0,6,Y,Y,Y,70,126,0
9700 DATA 0,100,Y,126,98,Y,Y,0
9705 DATA 0,96,Y,Y,Y,98,126,0
9710 DATA 0,126,106,Y,Y,Y,Y,0
9715 DATA 0,122,106,Y,Y,Y,110,0
9720 DATA 0,100,70,Y,Y,Y,126,0
9725 DATA 0,126,98,126,96,Y,Y,0
9730 DATA 0,126,98,Y,106,Y,126,0
9735 DATA 0,126,98,124,98,Y,Y,0
9740 DATA 0,126,96,126,6,Y,126,0
9745 DATA 0,126,24,Y,Y,Y,Y,0
9750 DATA 0,98,Y,Y,Y,Y,126,0
9755 DATA 0,98,Y,Y,Y,52,8,0
9760 DATA 0,106,Y,Y,Y,Y,126,0
9765 DATA 0,66,102,24,Y,102,66,0
9770 DATA 0,98,Y,126,24,Y,Y,0
9775 DATA 0,126,6,12,24,48,126,0
9780 DATA 96,240,248,252,255,Y,Y
,63
9785 DATA 0,Y,Y,Y,248,254,255,22
4
9790 DATA 0,3,12,48,192,48,12,3
9795 DATA 0,Y,3,12,42,12,3,0
9800 DATA 0,Y,Y,Y,Y,Y,85,0
9805 DATA 60,126,219,Y,126,60,66
,129
9810 DATA 1,2,4,8,16,32,64,128
9815 DATA 128,64,32,16,8,4,2,1
9820 DATA 0,Y,Y,Y,Y,60,66,126
9825 DATA 0,Y,Y,24,Y,0,Y,Y
9830 DATA 0,Y,60,36,Y,60,0,Y
9835 DATA 0,126,66,Y,Y,Y,126,0
9840 DATA 255,129,Y,Y,Y,Y,Y,255
9845 DATA 32,132,16,1,72,2,16,12
8
9850 DATA 0,Y,Y,3,Y,0,Y,Y
9855 DATA 0,Y,Y,192,Y,0,Y,Y
9860 DATA 0,Y,63,54,Y,63,0,Y
9865 DATA 0,Y,252,2,Y,252,0,Y
9870 DATA 3,12,112,129,Y,112,12,
3
9875 DATA 192,48,14,129,Y,14,48,
192
9880 DATA 0,Y,Y,Y,Y,110,0,Y
9970 DIM S$(5,12): DIM S(5): FOR
 X=1 TO 5: LET S$(X)="ZX SPECTRU
M": NEXT X
9980 POKE 23658,0
9990 DIM D(6): LET D(1)=-2: LET
D(2)=2: LET D(3)=-1: LET D(4)=1
: LET D(5)=-3: LET D(6)=3
9999 RETURN
```

NB REPLACE LINE 1155 WITH -

```
1155 IF (LA=2 OR LA=3) AND LD=OS
D THEN LET SD=OSD: GO SUB 3000:
GO TO NEXT
```

USER DEFINED GRAPHICS ARE -

A= B= C= D= E= F= G=/ H=\

I= J= K= L= M= N= O= P=

Q= R= S= T= U=

Financial wizards . . .

***Tony Bridge** takes a look at the range of Spectrum programs available for small businesses*

By its very nature, the Spectrum is not a business machine If your particular interest in using a micro is to help a company of 200 employees or more, you can safely move on and up a couple of thousand pounds

The Microdrive, when it finally appears (soon, soon, say Sinclair) will enable the Spectrum to be used properly by businesses, but until then the machine is really only of use to the very small business And for small business applications, there are myriad programs

One of the most successful is *Visicalc*, which has become a generic title for financial 'spreadsheet' programs The term is a good indication of what these programs actually do

Imagine you are the owner of a small restaurant You know that if you spend a certain amount on food each week you can make so many meals and thus earn so much money What happens if you were to spend another £20 on your weekly spree? How many more meals would you be able to prepare, and thus how much more revenue would you create? What would be the result of extending your premises to include another 10 tables?

You could of course, just get a piece of paper and a pencil, and write all the figures down Being a Spectrum owner, however, there is another course open to you and that is to *Load* into your computer a spreadsheet program This will after some initial setting-up, produce a picture of all the effects on your original model of varying figures

The Spectrum is well served in this area — Sinclair with the aid of Psion have a spreadsheet package on the market in competition with several others How do they all compare?

Psion is well-known now as the producer of the Spectrum demonstration tape *Horizons* and *Hungry Horace*, *Flight Simulation*, etc *Vu-Calc* is its contribution to the financial software scene, and comes with detailed documentation, albeit only on the cassette inlay

Vu-Calc comes complete with an example which should definitely be looked at before *Loading* the main program The layout is similar to the mainframe programs; that is, several rows and columns which may be filled with text and numerical data, thus building up a matrix of boxes

In *Vu-Calc's* case, the rows run from A to Z, through AA to AZ and on to BH The columns are numbered 1 to 60 — these figures are for the 48K machine, they will be less for the smaller machine You may place text wherever you like within the matrix — a simple example will consist of headings such as Sales, Rent, and Profit along the top of the matrix, and maybe the months of the year making up the rows

Numerical data may now be input Only four columns of 18 rows each may be seen on-screen at any one time, but the red cursor which marks your present position may be moved to the edge of the screen, upon which the whole display moves in the desired direction You can thus cover the whole matrix very quickly

Once your data has been entered the real power of a spreadsheet program can be explored It's no good having all these figures just sitting there doing nothing — the benefit of a program like this is in the manipulation of such data

The program uses formulae defined by the user to work on the figures A simple example might be to invoke a formula to add box one to box two and display the result on box three In *Vu-Calc*, this formula can easily be repeated throughout the whole matrix, row by row and column by column

By moving the cursor around the boxes, the formula relevant to each box is displayed, then one or more of your figures can be amended and the result of such an alteration instantly calculated at your command

I found the program easy to work, but I would have liked a *Help* page at certain moments As it stands a short summary of commands is displayed as required, but these are infuriatingly meagre Also it is very easy to lose your carefully-typed data, and although one has to select the option to clear the program, I feel that there should be one more chance to return to the data sheet. In the main however, a useful program

Running out of memory!

Matcalc comes from Workforce with the usual detailed Epsom'd documentation This spreadsheet is a little more difficult to use than *Vu-Calc* but comes complete with two excellent and informative sets of example data, so that you may see the effects of real figures on the program Unfortunately, there is no display to start with as in *Vu-Calc*, and you have to work on entering the data with no visual feedback It is essential, therefore, to work out your matrix requirements before starting to input data at the keyboard

Matcalc will ask you for your matrix (row/column) requirements before you start, and there is a distinct advantage here over Psion's fixed grid In this way you will not find yourself running out of memory near the end of an exhausting session of entering data

Once all your figures are in *Matcalc's* memory, and the formulae set to your requirements the matrix complete with data and calculations is displayed A choice of 64 numerals per line or the Spectrum's more usual 32 per line, is available

Bear in mind that you will have to wait for the display to be printed each time you amend your data This is where the conventional *Vu-Calc* scores over *Matcalc* — data can be seen instantly on-screen However Workforce's program is far more flexible overall than Psion's

From Saxon Computing comes *Flexicalc* Again the program is accompanied by clear and detailed documentation,



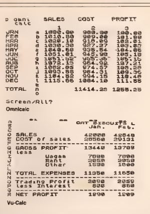
which is a necessity for these financial packages

Saxon claims that *Flexicalc* is "the most versatile of spreadsheet programs available for the Spectrum". Well, like *Matcalc* this program will allow you to dictate the size of matrix you wish to work in, and like *Vu-Calc* formulae may be changed and edited at will.

The section in the documentation referring to the construction of formulae is a lot easier to understand than either of the other two, and is actually a pleasure to read through. The formulae work relatively; the box currently being worked on is always box 000, regardless of its actual position in the matrix. This makes the business of devising formulae much easier than with *Vu-Calc* or *Matcalc*.

The *Copy Across* or *Copy Down* function allows you to repeat formulae across rows or down columns, as in the other two. The display of boxes is at first black on white paper, but you can dictate the colours of the final display.

Although a *Help* menu was present at all stages, I found data manipulation more of a hardship than in the *Vu-Calc* program, even though formulae were a lot easier to handle. The program is not very well idiot-proofed, however, and accidentally pressing the wrong key can prove disastrous — crashes seem to happen at the slightest provocation, although recovering control is not difficult. The calculations were not very fast when compared to Psion's lightning responses.



Omnicalc

Vu-Calc

However, Saxon provides an extremely good after-sales service with *Flexigen* which formats the whole of your matrix to the printer in such a way that you can cut up the various strips and paste them all together to make up one large report. This comes together with a *Consolidation* program for £6.95. As a complete financial spreadsheet package, the three programs are excellent value.

Microsphere is a newly-formed company that has a number of interesting-looking programs available. They have graced the spreadsheet world with *Omnicalc*.

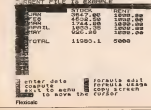
As with *Matcalc*, the user specifies his particular requirements for the matrix, dictating the number of rows and columns before work begins. The manual is by far the best, being written for the completely computer-naive, and not assuming prior knowledge of this type of program. A five-page example comes first, and this will take you painlessly through the secrets of *Omnicalc*.

Text and data input is largely the same as the other programs, with the text or figures being displayed in the matrix. There are, however, one or two important differences. First, whenever a function is selected, a letter appears top-left to show you exactly what mode you are currently in. Next, room is allocated around the matrix for text only, such as headings, categories and so on.

Type in *Jan* (for January) at Row 1, then "Y" (for Year), and the computer will instantly respond by filling the labels of the next eleven rows with the remaining months of the year. Of course, you don't have to have months as a label, but that is a frequent requirement for this type of program.

In the borders surrounding the boxes, only text and/or numbers may be written, but move the cursor into a box, and the program will allow text values (ie, straight numeric values), blanks, or equations (or formulae). This is the easiest program of all to use, I feel — not only does the manual contain detailed information on all

Continued on page 17



Flexicalc

Continued from page 15

the available functions but formulae are extremely easy to implement Any mistaken key presses can be recovered from by pressing *Edit*

Which spreadsheet for you? All the programs under review do their job well, and all have detailed and helpful documentation However I found the *Omnicalc* from Microsphere the easiest to work on and become familiar with

But maybe the spreadsheet idea as implemented in these Calc-type programs is not for you There are several titles available of a more specific nature One of these is *Modellerx* from CCS otherwise well known for its management games The program has two applications — to aid managers in making financial forecasts and thus decisions based on the projections, and secondly as a training aid for management trainees

The manual is very detailed and the manipulation of data is similar to the spreadsheets we have already looked at That is once the model is set up, the user can see the effect on the whole pattern, by changing just one piece of data

The first stage is to input various market factors — such as effectiveness of advertising and salesman sales targets market demands etc and then the variable data may be introduced

Worthy of consideration

This data will take the form of advertising costs showroom and office costs and all the other factors involved in running a financial business Change one and all the others will be affected in some way Four models may be set up at one time so that the differences between various sets of data can be compared on screen

We've seen a spreadsheet from Saxon Computing, and now we come to their Numeric Database *Figaro II* A numeric database is a program to handle large quantities of numeric information The program will arrange and manipulate the information into meaningful reports To explain that, look at the example given in the excellent manual

A chain of three shops acquires a new managing director who, being very dynamic asks for a forecast of sales in each shop for the next year based on the last two years sales together with a graph of each forecast and a table of the growth rate for each shop

Once all the sales figures are entered and this is very easy via an excellent display, graph plotting can begin Several options are open to the user such as barcharts line graphs or combinations of the two — and all in full colour hi-res colour graphics

Unlike many financial programs I feel this program is worthy of consideration by the larger business *Figaro* is completely error-trapped and the microdrive will make it even more useful

But maybe you do not run a business and would just like to know the state of your own bank account One of the newer Personal Systems to arrive is from Forest Software The *Personal Finance System* is "a maintenance of your current account with reconciliation to your bank statement" Up to 250 credit or debit entries are allowed, along with 30 standing orders The program is fairly straightforward, with prompts all the way to guide you An interesting point is the facility to see your future bank balance based on past data, The documentation is only average, but for £4 95 what can you expect.

Richard Shepherd, known mostly for his adventure programs, has produced a program called *Multi-Function Cash Controller* With this program you can keep track of eight budgets (gas, rent electricity, etc) and then see from your actual outgoings how you have kept within — or overspent! — your budget The program is fully menu-driven, and will guide you through the whole process

Another facility keeps track of your bank account, complete with standing orders As a bonus, there is a routine to take you through the complexities of a loan or mortgage — input any three of the parameters principle interest rate repayment time units of repayment and the *Cash Controller* will calculate the fourth parameter for you

That completes our look at financial packages for the Spectrum There are obviously many programs available and there will be many more available in the future — after all number manipulation is exactly what all computers, small or large PDP/II or Spectrum are good at ■

fo st re ru ra wa dr ex su hp

bank s/to cap sala +/- c/ba

Matcalc

Firm	Program	Cost
Microsphere Computer Services 72 Rosebery Road London N10	*Omnicalc*	£7 95
Saxon Computing 3 St Catherine Drive Leconfield Beverley Humberside	*Flexicalc* *Flexigen* *Consolidation* *Figaro II*	£6.95
Workforce 140 Willesden Avenue Luton Beds	*Matcalc*	£7 00
Psion 2 Huntsworth Mews London NW1	*Vu-Calc*	£8 95
CCS 14 Langton Way London SE3	*Modellerx*	£9 00
Forest Software 45 Southwold Bracknell Berks RG12 4XY	*Personal Finance System*	£4 95
Richard Shepherd 22 Green Leys Maidenhead Berks SL6 7EL	*Multi-function Cash Controller*	£10 00

rum

The ZX Printer – available now

Designed exclusively for use with the Sinclair ZX range of computers, the printer offers ZX Spectrum owners the full ASCII character set – including lower-case characters and high-resolution graphics

A special feature is COPY which prints out exactly what is on the whole TV screen without the need for further instructions Printing speed is 50 characters per second, with 32 characters per line and 9 lines per vertical inch

The ZX Printer connects to the rear of your ZX Spectrum A roll of paper (65ft long and 4in wide) is supplied, along with full instructions Further supplies of paper are available in packs of five rolls

The ZX Microdrive – coming soon

The new Microdrives designed especially for the ZX Spectrum are set to change the face of personal computing by providing mass on-line storage

Each Microdrive can hold up to 100K bytes using a single interchangeable storage medium

The transfer rate is 16K bytes per second with an average access time of 3 5 seconds And you ll be able to connect up to 8 Microdrives to your Spectrum via the ZX Expansion Module

A remarkable breakthrough at a remarkable price The Microdrives will be available in the early part of 1983 for around £50





ZX Spectrum software on cassettes – available now

The Spectrum software library is growing every day Subjects include games education, and business/household management Flight Simulation Chess Planetoids History Inventions VU-CALC VU-3D Club Record Controller there is something for everyone And they all make full use of the Spectrum s colour, sound and graphics capabilities You ll receive a detailed catalogue with your Spectrum

ZX Expansion Module

This module incorporates the three functions of Microdrive controller local area network, and RS232 interface Connect it to your Spectrum and you can control up to eight Microdrives communicate with other computers, and drive a wide range of printers

The potential is enormous, and the module will be available in the early part of 1983 for around £30

sinclair

Sinclair Research Ltd, Stanhope Road, Camberley, Surrey GU15 3PS
Tel Camberley (0276) 685311.

How to order your ZX Spectrum

BY PHONE – Access, Barclaycard or Trustcard holders can call 01-200 0200 for personal attention 24 hours a day, every day BY FREEPOST – use the no-stamp needed coupon below You can pay by cheque, postal order, Access Barclaycard or Trustcard

EITHER WAY – please allow up to 28 days for delivery And there s a 14-day money-back option, of course We want you to be satisfied beyond doubt – and we have no doubt that you will be

To: Sinclair Research, FREEPOST, Camberley, Surrey, GU15 3BR. **Order**

Qty	Item	Code	Item Price £	Total £
	Sinclair ZX Spectrum – 16K RAM version	100	125 00	
	Sinclair ZX Spectrum – 48K RAM version	101	175 00	
	Sinclair ZX Printer	27	59 95	
	Printer paper (pack of 5 rolls)	16	11 95	
	Postage and packing orders under £100	28	2.95	
	orders over £100	29	4 95	
			Total £	

Please tick if you require a VAT receipt ☐

*I enclose a cheque/postal order payable to Sinclair Research Ltd for £ ______

*Please charge to my Access/Barclaycard/Trustcard account no

*Please delete/complete as applicable

Signature

PLEASE PRINT

Name Mr/Mrs/Miss

Address

POC 904

FREEPOST – no stamp needed **Prices apply to UK only.** **Export prices on application.**

Chequed and banked . . .

S Brown presents a personal accounts program for the 16K Spectrum.

I wrote this program for my own needs as I found it annoying searching through my chequebook stubs to check my account with the bank s monthly statement With this program the cheques are listed in order, making particular transactions easier to find

When Run, the program asks for the user s account number (when typing in the program, the user should insert his own number in place of the *Xs* in lines 60 and 1230 — in line 1240 the *Os* serve as the bank s area code) If a wrong account number is entered, the program *News* itself after flashing *Incorrect data* A correct number displays a menu.

The menu allows the user to *Save* on tape, start afresh, dedit/credit or display the account. The account is printed like a bank statement with 14 transactions listed User prompts are at the bottom of the page — asking if the display is to be printed or continued At the end of the file, a return to the menu is requested

A particular transaction may be found quickly by giving either the date or details of the transaction If the transaction is not found the user is asked to try again or return to the menu Once found the transaction is printed at the top of the account display

Crediting/debiting the account is simple The user prompts ask for the date details and amount, which is then printed and checked by the user If correct the information goes to up-date the account

The program also keeps the date and balance part of the display in line Is the balance is printed with the decimal points in order

The program should be easy to convert to other computers — those with a larger memory then 16K could possibly add other features such as automatic debiting or standing orders

Notes

1-5	DIM variables, a$ stores the date t(n,1) stores the amount credited or debited t(n,2) stores the balance b2 calculates the new balance (starts as zero)
20-40	Sets INK colour and introduces program
50-60	INPUT users own account number If wrong NEWs the program
60	The X s are for the user to insert his own account number
50-130	Displays the menu
135	Sets variable Z to zero Z is used during the program so the computer knows which part of the program is being performed (see line 530)
140-190	Awaits users INPUT
200	Acts as a Mugtrap
215	Variable P is to check if the screen is full
220	FOR-NEXT loop using N as the counter
230	Checks if t(n 1) is zero If so then there are no more entries left in the file
240	If line 230 was zero then GOSUB 1270 DRAWS borders around the display
250	On return from line 240 a user prompt is displayed
260	GOTO 400 sends the program to ask for user INPUT is Printout or menu
270	Checks if variable P + 14 = N if so then the screen is full
272-278	e is tan to temporarily store the present balance. In a FOR-NEXT loop each item in the being is tested to find once found a space is added before the thing This ensures the decimal points are printed in line
290	PRINTS the files contents ie DATE DETAILS DEBIT BALANCE v$(n) a$(n) t(n 1) e$ or t(n 2)
300	Sends the computer to DRAW a border around the display
310	PRINTS a user prompt.
400-440	Awaits user INPUT
460-490	FOR-NEXT loop to clear the display ready for the next part of file display
510	Sets P equal to N to ensure next side round the display lies only 14 lines in it.
520	Makes printouts of the display
530	Sends the computer back to the user prompt
560-570	Menu for displaying particular account.
580-610	Awaits user INPUT
640-675	FOR-NEXT loop comparing users date INPUT with memory once found sends computer to display the account with the particular transaction at the top of the screen
681-688	Performs same task as above but compares Details INPUT
690	If Date not found then user prompt displayed
700-730	Awaits user INPUT
750-770	FOR NEXT loop checking for the last account entry once found the value of N is where the next transaction can be placed
780	User prompt for Date
800,820	FOR-NEXT loop to insert a space if needed before the date to ensure dates are printed in line
830	Z is checked to find what part of the program is being performed Is if greater than zero then the program is working on the section that displays a particular account from line 540 onwards If Z = 0 then the account is being credited or debited
844	Lets v store the new date
860	Checks Z again for above reason
865	Lets a store transaction details
880	Users prompt
900-920	Awaits user INPUT
930	S$ stores INPUT from INKEY$ answer
940	User prompt
950-1010	Amount debited/credited INPUTted and stored in t(n 1)
1020	Mugtrap
1030-1050	Calculates new balance from value of old balance b2
1050	Stores new balance in t(n,2)
1060 1070	Displays new information INPUTted
1080	Users prompt
1090-1100	Awaits user INPUT
1103-1110	If the information displayed was incorrect then the balance is adjusted to read as before and the computer sent to line 780 for the user to reINPUT the information.
1120-1190	User prompts.
1230	The Xs are for the user to insert his own account number
1240	The O s are to insert the bank s area code number
1250-1260	Displays the accounts heading
1270	Sets INK colour to green.
1280-1310	DRAWS boundaries around the display
1500	User prompt for tape storage
1510	INPUT for file name storing it in a$
1520	Check length of string
1530	User instruction
1540	SAVES program and the line number from which the program will RUN when reloaded
1530	User prompt.
1560	VERIFYS program
1560-1610	User prompts
1630	Resets variables by RUNning the program

```
   1 DIM a$(70,6)
   2 DIM t(70,2)
   3 DIM v$(70,7)
   5 LET b2=0
   6 REM © S.BROWN MARCH 1983
  10 REM Personal Accounts,Menu
  20 INK 1  CLS
  30 PRINT AT 10,6,"PERSONAL ACC
OUNTS"
  40 PAUSE 75  CLS
  50 PRINT AT 10,0,"ENTER ACCOUN
T CODE NUMBER"
  55 INPUT a1
  60 IF a1=XXXXX THEN GO TO 80
  70 PRINT AT 10,0, INK 2, FLASH
 1,"          INCORRECT DATA
   "  PAUSE 125  NEW
  80 CLS   PRINT AT 5,0,"ENTER "
  PAUSE 30
  90 PRINT '"1-TO CREDIT OR DEBI
T ACCOUNT"  PAUSE 25
 100 PRINT '"2-TO DISPLAY ACCOUN
T"  PAUSE 25
 110 PRINT '"3-TO DISPLAY KNOWN
TRANSACTION"  PAUSE 25
 120 PRINT '"4-TO SAVE ON TAPE"
  PAUSE 25
 130 PRINT '"5-TO START FRESH AC
COUNT"
 135 LET z=0
 140 INPUT a
 150 IF a=1 THEN GO TO 740
 160 IF a=2 THEN GO SUB 1210
 170 IF a=3 THEN GO TO 540
 180 IF a=4 THEN GO SUB 1500  GO
 TO 80
 190 IF a=5 THEN GO TO 1600
 200 IF a<1 OR a>5 THEN GO TO 14
0
 210 REM Display actual account
 215 LET p=1
 216 PRINT
 220 FOR n=p TO 70
 230 IF t(n,1)<>0 THEN GO TO 270
 240 GO SUB 1270
 250 PRINT AT 21,0,"END OF FILE.
0-PRINTOUT, M-MENU"
 260 GO TO 400
 270 IF p+14=n THEN GO TO 300
 272 LET e$=STR$ t(n,2)
```

```
274 FOR w=1 TO 3
278 IF e$(w)="." THEN LET e$="
"+e$
278 NEXT w
280 PRINT v$(n),TAB 8,a$(n);TAB
17,t(n,1),TAB 24,e$
290 NEXT n
300 GO SUB 1270
310 PRINT AT 21,0,"PRESS C-CONT
INUE, Q-PRINTOUT"
400 IF INKEY$="" THEN GO TO 400
410 IF INKEY$="m" OR INKEY$="M"
THEN GO TO 50
420 IF INKEY$="c" OR INKEY$="C"
THEN GO TO 460
430 IF INKEY$="q" OR INKEY$="Q"
THEN GO TO 520
440 GO TO 400
460 FOR l=21 TO 4 STEP -1
470 PRINT AT l,0,"
"
480 BEEP 0.05,0
490 NEXT l
500 LET p=n
510 GO TO 220
520 COPY
530 GO TO 400
540 REM Display particular acco
unt
545 CLS
550 PRINT AT 5,0,"ENTER."  PAUS
E 30
560 PRINT '"1-IF TRANSACTION DA
TE IS KNOWN"  PAUSE 25
570 PRINT '"2-IF DETAILS ARE KN
OWN"
580 INPUT z
590 IF z=1 THEN GO SUB 780
600 IF z=2 THEN GO SUB 850
610 IF z<1 OR z>2 THEN GO TO 58
0
620 CLS
630 IF z=2 THEN GO TO 681
640 FOR n=1 TO 70
650 LET p=n
660 IF v$(n)=d$ THEN GO SUB 121
0
670 IF v$(n)=d$ THEN GO TO 215
678 NEXT n
680 GO TO 690
681 FOR n=1 TO 70
682 LET p=n
684 IF a$(n)=k$ THEN GO SUB 121
0
686 IF a$(n)=k$ THEN GO TO 215
688 NEXT n
690 PRINT AT 5,0,"DATA INPUT NO
T FOUND. PRESS T TOTRY AGAIN OR
M TO RETURN TO MENU"
700 IF INKEY$="" THEN GO TO 700
710 IF INKEY$="t" OR INKEY$="T"
THEN GO TO 540
720 IF INKEY$="m" OR INKEY$="M"
THEN GO TO 80
730 GO TO 700
740 REM Credit/Debit Account
750 FOR n=1 TO 70
760 IF t(n,1)=0 THEN GO TO 780
770 NEXT n
780 CLS   PRINT AT 10,0,"ENTER
DATE (AS 3JAN82)"
785 INPUT d$
800 FOR U=65 TO 122
810 IF D$(2)=CHR$ U THEN LET D$
="  "+D$
820 NEXT U
830 IF z>0 THEN RETURN
840 LET v$(N)=D$
850 CLS   PRINT AT 5,0,"ENTER D
ETAILS OF TRANSACTION      (ie.CHE
00332 OR STAORDER)"
860 INPUT k$
880 IF z>0 THEN RETURN
885 LET a$(n)=k$
890 PRINT AT 10,0,"IS TRANSACTI
ON A DEBIT OR CREDITPRESS D FOR
DEBIT OR C FOR        CREDIT"
900 IF INKEY$="" THEN GO TO 900
910 IF INKEY$="c" OR INKEY$="C"
 OR INKEY$="d" OR INKEY$="D" THE
N GO TO 930
920 GO TO 890
930 LET s$=INKEY$
940 CLS   PRINT AT 10,0,"ENTER
AMOUNT CREDITED OR DEBITEDIN POU
NDS TO TWO DECIMAL PLACES,NO HAL
F-PENNIES (ie.£128.50)"
950 INPUT "£",b
1010 LET t(n,1)=b
1020 IF s$="d" OR s$="D" THEN GO
 TO 1050
1030 LET b2=b2+b
1040 GO TO 1060
1050 LET b2=b2-b
1060 LET t(n,2)=b2
1065 CLS   PRINT AT 8,0," DATE
 DETAILS  AMOUNT BALANCE"
1070 PRINT AT 10,0,v$(n),TAB 8,a
$(n),TAB 17,t(n,1),TAB 24,t(n,2)
1080 PRINT AT 15,0,"IS THE ABOVE
 CORRECT? Y FOR YES"
1090 IF INKEY$="" THEN GO TO 109
0
1100 IF INKEY$="Y" OR INKEY$="y"
 THEN GO TO 1120
1103 IF s$="c" OR s$="C" THEN LE
T b2=b2-b
1105 IF s$="d" OR s$="D" THEN LE
T b2=b2+b
1110 GO TO 780
1120 CLS   PRINT AT 10,0,"IS THE
RE ANY MORE ENTRIES TO BE MADE?
Y FOR YES"
1130 IF INKEY$="" THEN GO TO 113
0
1140 IF INKEY$="y" OR INKEY$="Y"
 THEN GO TO 1147
1145 GO TO 80
1147 CLS
1150 PRINT AT 10,0,"IS THE DATE
THE SAME AS BEFORE? Y FOR YES"
1160 IF INKEY$="" THEN GO TO 116
0
1170 IF INKEY$="y" OR INKEY$="Y"
 THEN GO TO 1180
1175 GO TO 740
1180 LET n=n+1
1190 GO TO 840
1210 REM Display Account
1220 CLS
1230 PRINT "      ACCOUNT NUMBER
   XXXXX"
1240 PRINT AT 0,20, INK 2,"0000"
1250 PRINT '" DATE   DETAILS  DE
BIT/ BALANCE"
1260 PRINT AT 3,17;"CREDIT"
1265 RETURN
1270 INK 4
1280 PLOT 0,140. DRAW 255,0  PLO
T 0,141. DRAW 255,0  PAUSE 20
1290 PLOT 60,8  DRAW 0,159  PAUS
E 20
1300 PLOT 132,8  DRAW 0,159  PAU
SE 20
1310 PLOT 186,8. DRAW 0,159  INK
 1
1320 RETURN
1500 CLS . PRINT AT 7,0,"ENTER N
AME OF FILE NOT EXCEEDINGTEN LET
TERS (ie.FEB1983)"
1510 INPUT "FILE NAME",e$
1520 IF LEN e$>10 THEN GO TO 151
0
1530 CLS   PRINT AT 10,10,"PLEAS
E WAIT"
1540 SAVE e$ LINE 10
1550 PRINT AT 10,0,"REWIND TAPE
AND PLAY TO VERIFY"''"IF TAPE LO
ADING ERROR OCCURS     ENTER RET
URN'"
1560 VERIFY e$  RETURN
1600 CLS   PRINT AT 10,6,"CLEARI
NG DATA BANKS"  PAUSE 50
1610 PRINT AT 18,0,"STANDBY FOR
ACCOUNT No REQUEST"  PAUSE 80
1620 IF a=8 THEN RUN
1650 GO TO 10
```

Screened for action!

James Brennan shows how to obtain a printed copy of the Vic20's Hi-res screen

This program is a subroutine to produce a printed copy of the Hi-res graphics screen. The graphics should be completed before calling up the subroutine.

The super expander cartridge is used for the Hi-res graphics and to help in the program with these two commands: *Rdot* — used to obtain the colour value of a dot on the screen, and is then compared with the background colour to see if it is part of a line. *Rcolr* — used to *Read* the colour contained in the colour register *Rcolr*(0) — background colour.

The graphics screen is a matrix of 1024 by 1024 pixels. This program divides these pixels into blocks 28 by 28, which represent the printer head matrix of 7 by 7. Each block is then subdivided into columns 4 pixels wide.

Each column is looked at 4 pixels at a time and if the colour value is not the same as the background, then its binary value is calculated. The final column value (+128) is then placed in a string array using *Chr$*, until the whole block has been read. It is then programmed into the printer.

The main program is suitable for graphs, etc, but because it prints out a square copy it distorts circles, etc. The three amendments to the program allow circles to be printed out correctly. They take into account the 70 per cent adjustment used when drawing circles.

Notes

10020	Open printer channel
10050	Divide matrix into blocks 28 by 28
10100	Divide blocks into rows 4 deep
10120	Divide rows into columns 4 wide
10130	Read colour value of each unit
10150	Compare colour with screen colour
10170	Calculating binary value
10200	Program into printer head
10220	Print out character **
10240	Return at end of line
10260	Close printer channel

NB: The printer prints out in bursts because it only prints when the data buffer is full.

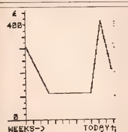
```
10000 REM*********** HI-RES PRINT OUT *****
      *****
10010 REM***** OPEN PRINTER CHANNEL *****
10020 OPEN4,4
10030 REM***** SPLIT PIXELS INTO BLOCKS
      OF 28 BY 28 *****
10040 REM*** TO REPRESENT THE PRINTER HEAD
      MATRIX ***
10050 FORJ=0TO1023STEP28
10060 FORI=0TO1023STEP28
10070 A$=""
10080 REM***** SPLIT EACH BLOCK INTO
      UNITS 4BY 4 *****
10090 REM*** TO REPRESENT EACH PIN ON THE
      PRINTER HEAD ***
10100 FORX=0TO24STEP4
10110 Z=0
10120 FORY=0TO24STEP4
10130 R=RDOT(I+X,J+Y)
10140 REM**** IF UNIT VALUE IS 0 THEN GO TO
      NEXT UNIT ****
10150 IFR=RCOLR(0)THEN10180
10160 REM**** CALCULATE BINARY VALUE OF THE
      UNIT ****
10170 Z=Z+(2↑(Y/4))
10180 NEXTY
10190 REM**** PROGRAM PRINTER HEAD ****
10200 A$=A$+CHR$((Z+128))
10210 NEXTX
10220 PRINT#4,CHR$(8)A$,
10230 NEXTI
10240 PRINT#4
10250 NEXTJ
10260 PRINT#4 CLOSE4
10270 RETURN

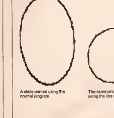
READY.
```

PRINTING CIRCLES ETC.

```
AMEND THE PROGRAM AS FOLLOWS

10050 FORJ=0TO1023STEP49
10120 FORY=3TO45STEP7
10170 Z=Z+(2↑((Y-3)/7))
```





A circle printed using the normal program

The same circle printed using the line changes

A random sample. . .

Boris Allan presents a program to assist in the sampling of distributions and tha drawing of histograms

In statistics, one of the most important items we have to learn is that of sampling distributions In the presentation of statistics one of the most important items is that of the drawing of histograms *Stanorm* tries to assist in both these areas

The Central Limit Theorem effectively states that (providing there are sufficient) the adding of random values will produce a normal distributed value As the mean is little more than the summation of random values (which is why we have *random* sampling) this is why the mean is taken to have a normal distribution (ie a sampling distribution which is Normal or Gaussian)

The Law of Large Numbers tells us that the greater the number of summed values we examine, the closer the resulting distribution will be to the ideal (of a normal distribution) This program allows these views to be examined

The accuracy of the Central Limit Theorem is checked via function *Fnnormal* (x) six random values (from 0 to 1) are added to the constant 6 and six random values (0 to 1) are subtracted (the result is *V*) I could have added twelve random values, and not bothered with the constant 6, but by inverting half of the random values randomness is increased If the Central Limit Theorem is correct, this should produce an almost perfectly normally distributed variable

The normal variates produced by *Fnnormal* are used in *Procsample* (*Num*, *Cat*), where *Num* is a parameter which gives the number of quasinormal deviates to be examined, and *Cat* gives the number of categories into which the values are to be grouped (in array *V*) Line 510 gets a normal deviate, collects the sum in *Mean* and the sum squares in *SD* and adds 1 to the number in the correct category of array *V* (ie *V*(*J*))

After all the values have been allocated, the size of the largest category is held in V(0) (line 520), and finally the mean and standard deviation are calculated (the mean has the value 6 subtracted) For a perfect normal distribution, the mean should be 0 0 and the standard deviation should be 1 0

The program splits the screen at line 26 on the screen after the initial information has been requested partly so that the cursor does not interfere with the display and mainly so that the mean and deviation can be output under the graphics This division is accomplished by *Procinit*

After setting the foreground colour to 2, and the background to 129 (yellow print red background in mode 1) the screen is cleared The size of sample (ie number of observations) and the total number of categories are then requested, and the text window is set from line 26 on the screen to line 30 (program line 630) If the mode is changed from 1 to 5 (the other four colour mode and one which can be used for Model A), the *VDU* command becomes

638 VDU 28 6 30 18 26

and the mode has to be altered in line 210 Though mode 5 does work, the resolution is inferior to that of mode 1, and the effect is not as convincing In fact, it might be preferable to change *Procfreq* to a dummy procedure

The actual histogram, and frequency polygon are produced by *Prochist* (*Lower*, *Upper*, *Number*) where *Lower* gives the height of the histogram's base (as a Y co-ordinate) and *Higher* gives the maximum co-ordinate allowed for the histogram and the third parameter gives the *Number* of categories (note that this makes *Prochist* quite general and can be used in other programs)

The histogram is designed to fit between horizontal co-ordinates 39 and 1239 with a bar width (*WI*) of 1200 *Number* The base of the histogram is at *Lower* and the maximum is at *Upper*

The bars in the histogram are drawn by *Procbar*, and the frequency polygon is drawn by *Procfreq* (line 700 can be omitted in mode 5) *Procbar* (*A*,*B C*,*D*) draws bars by changing the graphics window, making the graphics colour 131 (ie, white) and then clearing the window with that colour thus appearing to draw a bar of white *Procfreq* plots from the middle of the top of each bar to the middle of the next, and is quite general in use

★*FX 15, 0* clears the input buffer, so that idle doodling does not cause the results to disappear off the screen (in the text window at the bottom), and line 260 merely formats the output of the mean and standard deviation to three decimal places, then resetting the formatter ●

```
LIST
  100REM---------  ------ -------------
  110REM
  120REM SAMPLING DISTRIBUTION FOR
  130REM STANDARD NORMAL CURVE
  140REM
  150REM
  160REM (C) BORIS ALLAN, 1983
  170REM
  180REM
  190REM-------------------------------
  200REM--------- ---------------------
  210MODE1
  220PROCINIT
  230PROCSAMPLE(SIZE,CATS)
  240PROCHIST(300,700,CATS)
  250*FX15,0
  260@%=&01020307:PRINT'"MEAN IS ";MEAN"    SD IS ";SQR(SD)':@%=10
  270END
  280REM---------------------------------
  290REM---------------------------  --
  300DEF PROCBAR(A,B,C,D) : REM DRAWS A BAR FOR HISTOGRAM
```

```
310LOCAL a,b,c,d
320a=A:b=C:c=A+B:d=C+D
330VDU 24,a;b;c;d;
340GCOL0,131
350CLG
360ENDPROC : REM BAR
370REM-------------------------------
380REM-------------------------------
390DEF PROCFREQ(X,INC,NUM,BASE,ROOF) : REM FREQUENCY POLYGON
400LOCAL I,H:H=ROOF-BASE: VDU 24,0;0;1279;1023;:PLOT4,X,(BASE+H*(V(1)
/V(0)))
410GCOL0,0
420FORI=2TO NUM:PLOT5,X+INC*(I-1),H*V(I)/V(0)+BASE:NEXTI
430ENDPROC : REM FREQ
440REM-------------------------------
450REM-------------------------------
460DEF FNNORMAL(X):LOCALV,I: V=6:FORI=1TO 6:V=V+RND(1)-RND(1):NEXTI:
=V : REM NORMAL DEVIATE 0 MEAN, 1 SD
470REM-------------------------------
480REM-------------------------------
490DEF PROCSAMPLE(NUM,CAT) : REM TAKES A 'SAMPLE' OF SIZE NUM, AND
COLLECTS THE RESULTS IN CAT CATEGORIES
500LOCALI,J:MEAN=0:SD=0
510FOR I=1TO NUM: J=FNNORMAL(I):MEAN=MEAN+J:SD=SD+J*J:J=INT(J*CAT/
12+1):V(J)=V(J)+1:NEXTI
520FORJ=1TO CAT:V(J)=V(J)/NUM:IF V(0)<V(J) V(0)=V(J)
530NEXTJ
540MEAN=MEAN/NUM:SD=SD/NUM-MEAN*MEAN:MEAN=MEAN-6
550ENDPROC : REM SAMPLE
560REM-------------------------------
570REM-------------------------------
580DEF PROCINIT : REM FINDS SAMPLE SIZE AND NUMBER OF CATEGORIES
590COLOUR2:COLOUR129:CLS
600PRINT'''"SAMPLE DISTRIBUTIONS "
610INPUT'"SIZE OF SAMPLE "SIZE
620INPUT"CATEGORIES ARE "CATS:DIMV(CATS)
630VDU28,0,30,32,26
640ENDPROC : REM INIT
650REM-------------------------------
660REM-------------------------------
670DEF PROCHIST(LOWER,UPPER,NUMBER) : REM PRODUCES HISTOGRAM AND
FREQUENCY POLYGON
680LOCALI,ST,WI,HI:ST=39:WI=1200/NUMBER:HI=UPPER-LOWER
690FORI=1TO NUMBER:PROCBAR(ST+(I-1)*WI,WI,LOWER,HI*(V(I)/V(0))):NEXTI
700PROCFREQ(ST+WI/2,WI,NUMBER,LOWER,UPPER)
710ENDPROC : REM HIST
720REM-------------------------------
```

Another dimension . . .

***Joseph Burr** shows how a Spectrum program can be modified to draw 3-D graphics for the Dragon.*

Ian Reynolds presented a program to draw 3D graphics on the ZX Spectrum (*Popular Computing Weekly* 10th September 1982). The following is a modification of that program for the **Dragon 32**.

The program draws a three dimentional view of any formula the computer is given to process. The plot is as if the formula was started in the centre of the grid and rotated through the 360 degrees of a circle.

Program notes

Line(s)	
50 to 160	These lines set up the grid on which the design is plotted
170 to 180	This portion of the program holds the picture on the screen until the space bar is pressed
190	Prevents the screen clearing if the space bar was accidentally pressed.
200 to 230	This section moulds the shape of the formula on to the grid
220	This line holds the formula to be plotted
260 and 280	These lines make sure the formula is plotted starting from position 150 down the screen
290 and 300	These lines prevent the plot leaving the screen limits

Making up your own formulae

If you wish to experiment the best functions to use are those involving sines (*Sin*) and cosines (*Cos*) of the 'active' variable Q, as these give interesting wave formations. Tans (*Tan*) and exponentials (*Exp*) are more difficult to use but with careful working interesting shapes from formulae involving these functions and others (squares (r2), square roots (*Sqr*), logs (*Log*), and arctans (*Atn*)) can be written.

If the 'bumps' are too high divide the original formula by a 'suitable' figure to bring the plot down. If the 'bumps' are too low, the values of Q can be multiplied by a 'suitable' value to increase the height of the plot. These values are best found by experiment. If you wish to invert the display on the screen add a minus sign to the front of the formula.

The program takes between 10 and 20 minutes to draw out the completed diagram depending on the formula in line 220.

Working formulae

COS(Q*2)/6
SIN(Q*3)+(Q)/4
COS(TAN(Q/15)−SIN(Q*2))

−SIN(Q*4)/6
SIN(Q*3)+COS(Q)/4
(−EXP(Q/3)−EXP(Q))/70

```
10 DIMN(250,2)
20 PMODE4,1:PCLS:SCREEN1,1:LET[illegible]
30 FORX=1TO250:LETN(X,2)=255
40 NEXTX
50 FORX=-50TO50STEP5
60 LETQ=X:A=50-ABS(X)
70 FORY=-70TO70
80 E=70-ABS(Y)
90 GOSUB200:NEXTY
100 IFX=50THENGOTO170
110 FORD=X+1 TO X+4
120 LETA=50-ABS(D)
130 FORY=-70TO70STEP5
140 LETE=70-ABS(Y)
150 GOSUB200
160 NEXTY,D:NEXTX
170 FORA=1TO6:LETA$=INKEY$:NEXTA
180 IFINKEY$<>" "THENGOTO180
190 ST[illegible]
200 LETQ=A*E/800
210 LETH=D+Y+121
220 LETQ=(-EXP(Q/3)-EXP(Q))/[illegible]
230 LETQ=191-INT(80+D-Q*80)
240 IFX=-50THENLETN(H,2)=Q
250 IFQ<=N(H,1)THENGOTO330
260 IFK=1THENLETV=150-Q:K=0
270 LETN(H,1)=Q
280 LETQ=Q+V
290 IFQ>191THENLETQ=191
300 IFQ<0THENLETQ=0
310 PSET(H,Q,5)
320 RETURN
330 IFX=-50THENGOTO350
340 IFQ>=N(H,2)THENRETURN
350 LETN(H,2)=Q
360 GOTO280
```

Open Forum is for you to publish your programs and ideas. Take care that the listings you send in are all bug-free. Your documentation should start with a general description of the program and what it does and then give some detail of how the program is constructed. We will pay the *Program of the Week* double our new fee of £6 for each program published.

Partial screen clear

on Spectrum

This is a machine code program for the ZX Spectrum which allows you to clear part of the screen.

Unfortunately, because of the way the Display File is arranged, it is only possible to clear blocks of eight lines, so you can clear the top eight lines, the middle eight lines, the bottom eight lines or any combination of the three. By altering the second number in the data it is possible to fill the screen. This number is used like the numbers in user definable graphics so if you change the 0 to 255 it will fill the screen with a solid black square.

The Z80 Mnemonics are as follows:

Ld C,0	14 0
Ld HL, start	33 0 64
Ld DE limit	17 0 88
Ld (HL) C	113 — Loop
INC HL	35
Ld A,D	122
SUB H	148
JRNZ Loop	32 250
Ld A,E	123
SUB L	149
JRNZ Loop	32 246
RETURN	201

As the program stands it will clear the complete screen so to clear part of the screen change the numbers underlined. To clear the top third only change the 88 to 72, to clear the bottom third change the 64 to 80 and to clear the middle third change the 64 to 72 and the 88 to 80.

When you have run the program it should give you the stop report, so to run the machine code enter *Continue* and the screen should fill with a solid black square and then clear.

```
  1 REM XXXXXXXXXXXXXXXXXX
 10 FOR n=23760 TO 23778
 20 READ a
 30 POKE n,a
 40 NEXT n
 50 DATA 14,0,33,0,64,17,0,88,1
13,35,122,148,32,250,123,149,32,
246,201
 60 STOP
 70 FOR n=0 TO 21: PRINT AT n,0
[redacted]
    NEXT n
100 RANDOMIZE USR 23760
```

When run line 1 will now look like this

```
  1 REM ?X q#zE IF £F PLOT
```

Partial screen clear

Maths

on ZX81

Maths runs on the 16K ZX81 and attempts to teach children in the range of 5-7 years the basic principles of addition and subtraction.

The program is extremely user-friendly and actually sets out each sum as a child of that age would on paper, including carry digits, which the computer is intelligent enough to ignore and not request if not necessary in a particular sum.

The program will not set a sum producing a negative number, which would confuse the child, and the sum is set out correctly after he has answered, so that he can see where he made a mistake. After 10 sums the child is told how well he did and given the option of more (no, it isn't a stupid question, all the subjects I tested the routine on reached for the Y key).

The sum may be more difficult for an adult to answer than a child as it employs the techniques a young child would use. (Yes, I do remember as I am only 15 years old.) First the product (or subtractive remainder) of the units column, then the carry digit (the computer will not request one if not necessary) and finally the product of the tens column (likewise, if not necessary, it will not be requested).

Answering is, for the child, simplicity itself as a cursor (inverse "?") marks the spot where the next particular digit belongs in the answer. Upon running this process will be made clear (it is not easy to describe in words).

Program notes

50-650	Main program loop
90-110	Addition or subtraction sum? Two numbers?
120	Does sum produce a negative answer?
130-160	Calculates answer and converts numbers and answer to strings
180-200	Prints out sum and requests answer
250-500	Prints cursor in appropriate place, bug checks and prints inkeys
500-560	Right or wrong?
560-600	Prints out correct sum and increments score if necessary
620-650	If not last sum, back to start of loop
660-770	If last sum, print results and rating
750-800	Does pupil want more sums?
1000-1120	Introductions subroutine (N$ pupil's name)

```
 10 REM **BASIC MATHS**
       BY RAYMOND SLAKE
        FEBRUARY 1983

 20 GOSUB 1000
 30 LET S=0
 40 RAND
 50 FOR I=1 TO 10
 60 CLS
 70 PRINT AT 2,5,"THIS IS SUM N
UMBER ";I
 90 LET A$="+-"(INT (RND*2+1))
100 LET X=INT (RND*10+1)
110 LET Y=INT (RND*10+1)
120 IF A$="-" AND X<=Y THEN GOT
O 100
130 LET X$=STR$ X
140 LET Y$=STR$ Y
150 LET ANS=(X+Y AND A$="+")+(X
-Y AND A$="-")
160 LET Z$=STR$ ANS
180 PRINT AT 8,16-LEN X$,X,AT 9
,13,A$,AT 9,16-LEN Y$,Y
190 PRINT AT 10,14,"▀▀",AT 12,1
4,"▀▀"
200 PRINT AT 15,1,"WHAT IS THE
ANSWER, ";N$;"?"
250 PRINT AT 11,15,"█"
260 LET Q$=INKEY$
270 IF Q$<"0" OR INKEY$>"9" THE
N GOTO 260
280 PRINT AT 11,15,Q$
290 IF LEN Z$=1 THEN GOTO 520
300 IF VAL X$(LEN X$)+VAL Y$(LE
N Y$)<10 THEN GOTO 350
310 PRINT AT 13,14,"█"
320 LET C$=INKEY$
330 IF C$<"0" OR C$>"9" THEN GO
TO 320
340 PRINT AT 13,14,C$
350 PRINT AT 11,14,"█"
360 LET R$=INKEY$
370 IF R$<"0" OR R$>"9" THEN GO
TO 360
380 PRINT AT 11,14,R$
500 LET Q$=R$+Q$
520 PRINT AT 15,0,"
                    "
530 PRINT AT 15,3,
540 IF Q$=Z$ THEN PRINT "YES, T
HAT'S RIGHT, ";
550 IF Q$<>Z$ THEN PRINT "NO, T
HAT'S WRONG, ";
560 PRINT N$
580 PRINT AT 17,10,X,A$,Y,"=",A
NS
```

Continued over the page

```
 600 IF Q$=Z$ THEN LET S=S+1
 610 IF I=10 THEN GOTO 650
 620 PRINT AT 19,0,"PRESS ""NEWL
INE"" FOR THE NEXT SUM"
 630 INPUT A$
 650 NEXT I
 680 PRINT AT 19,4,"PRESS ""NEWL
INE"" TO SEE",AT 20,5,"HOW YOU D
ID, ",N$
 670 INPUT A$
 700 CLS
 710 PRINT AT 3,2,"YOUR SCORE WA
S ";S;" OUT OF 10",,
 730 IF S<5 THEN PRINT "WHICH IS
NOT VERY GOOD, ",N$
 740 IF S>=5 AND S<8 THEN PRINT
"  WHICH IS QUITE GOOD, ",N$
 750 IF S>=8 THEN PRINT "  WHICH
IS VERY GOOD, ",N$
 760 FOR I=1 TO 50
 770 NEXT I
 780 PRINT AT 8,2,"DO YOU WANT T
O DO MORE SUMS?"
 785 PRINT AT 10,7,"ANSWER YES O
R NO"
 790 INPUT A$
 800 IF A$(1)="N" THEN GOTO 900
 810 IF A$(1)<>"Y" THEN GOTO 790
 820 PRINT AT 13,3,"OKAY, ",N$,"
, HERE WE GO"
 830 FOR I=1 TO 50
 840 NEXT I
 850 GOTO 30
 900 PRINT AT 13,4,"OKAY, ",N$,"
, GOODBYE,",AT 15,2,"BUT DON'T F
ORGET TO PRACTICE"
 999 STOP
1000 PRINT AT 2,1,"HELLO, I AM T
HE ZX81 COMPUTER",AT 4,3,"BUT YO
U CAN CALL ME ""ZX"""
1010 FOR I=1 TO 50
1020 NEXT I
1030 PRINT AT 7,6,"WHAT IS YOUR
NAME?"
1040 INPUT N$
1050 PRINT AT 10,3,"DO YOU LIKE
SUMS, ",N$,"?"
1060 INPUT A$
1070 PRINT AT 14,6,
1080 IF A$(1)="Y" THEN PRINT "I
LIKE SUMS AS WELL"
1090 IF A$(1)="N" THEN PRINT "OH
 WELL, I LIKE SUMS"
1100 PRINT AT 18,3,"LET'S DO SOM
E SUMS, ",N$
1110 FOR I=1 TO 50
1120 NEXT I
1130 RETURN
```

Maths
by Raymond Blake

Super tables

on Vic20

This program will run on the unexpanded Vic II is an educational game for the younger child and will help them learn the full range of multiplication tables.

The program allows you to select which times table you require, gives 40 seconds to learn them, then sets 12 questions for you to answer. Other facilities are question number, number right and number wrong — all accompanied by suitable tunes and colour.

```
10 REM****************
20 REM* SUPER TABLES*
30 REM*     BY      *
40 REM* J.ROBERTS   *
50 REM****************
60 REM
65 REM STARTING
70 POKE36879,110
80 PRINT"[CLR]"
90 PRINT"***** SUPER TABLES ***"
100 PRINT"HIT A KEY"
110 PRINT"
120 GETA$:IFA$=""THEN120
130 TY=0:TN=0:TT=0:PRINT"WHICH TABLE DO YOU
    WANT
140 INPUT"";A
145 PRINT"YOU HAVE 40 SECONDS"
146 REM PRINT TABLE
150 FORJ=1TO9
160 PRINT"";J"*";A;"=";A*J
170 NEXTJ
175 PRINT"";10"*";A;"=";A*10
185 PRINT"TO KNOW YOUR "A"TIMES"
190 FORT=1TO6000:NEXTT
195 REM QUESTIONS
200 PRINT"[CLR]"
201 TT=TT+1
202 IFTT=13THEN3000
205 B=INT(RND(1)*12)
210 PRINT"";B"*"A"="
215 PRINT"YOU ARE ON QUESTION"TT
220 INPUT"";C
230 IFC<>B*ATHEN400
235 REM SUM RIGHT
240 PRINT"
250 PRINT"
260 PRINT"
270 PRINT"
280 PRINT"
290 PRINT"
300 PRINT"
305 TY=TY+1
310 GOSUB1000
320 GOTO200
325 REM SUM WRONG
400 PRINT"
410 PRINT"
420 PRINT"
430 PRINT"
440 PRINT"
450 PRINT"
455 TN=TN+1
460 GOSUB2000
470 GOTO200
475 REM SOUND
1000 POKE36878,15
1001 FORL=1TO3
1002 FORM=180TO235STEP2
1003 POKE36876,M
1004 FORN=1TO10
1005 NEXTN:NEXTM
1006 POKE36876,0
1007 FORM=1TO100
1008 NEXTM:NEXTL
1009 POKE36878,0
1010 RETURN
2000 POKE36878,15
2001 FORL=1TO50
2003 POKE36875,INT(RND(1)*130)+130
2004 FORM=1TO10
2005 NEXTM:NEXTL
2006 POKE36876,0
2007 POKE36878,0
2008 RETURN
2009 REM YOU'VE DONE 12 SUMS
3000 IFTY=12THEN5000
3001 PRINT"YOU GOT "TY"RIGHT"
3002 PRINT"AND"TN"WRONG"
3003 PRINT"HIT Y OR N"
3004 GETA$:IFA$="Y"THEN130
3005 IFA$<>"N"THEN3004
3006 PRINT"[CLR]":POKE36879,29:END
3007 REM YOU GOT THEM ALL RIGHT!
5000 PRINT"YOU GOT THEM ALL          RIGHT!"
5001 REM PLAY SONG
5010 S2=36875
5020 V=36878
5030 REM READ AND PLAYLOOP
5040 POKEV,15
5050 READP
5060 IFP=-1THEN6030
5070 READD
5080 POKES2,P
5090 FORN=1TOD:NEXTN
6000 POKES2,0
6010 FORN=1TO20:NEXTN
6020 GOTO5050
6030 REM IF NOTE-1THENSTOP
6040 POKES1,0
6050 GOTO7040
6060 DATA225,360,225,360,225,240
6070 DATA228,120,231,360,231,240
6080 DATA228,120,231,240,232,120
6090 DATA235,720,240,360,235,360
7000 DATA231,360,235,360,235,240
7010 DATA232,120,231,240,228,120
7020 DATA225,480
7030 DATA-1
7040 PRINT"HIT Y OR N"
7050 GETA$:IFA$="Y"THEN130
7060 IFA$<>"N"THEN7050
7070 PRINT"[CLR]":POKE36879,29:END
7080 REM END OF PROG
```

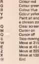
Super tables
by D V Roberts

Compart

on Dragon

Compart is a graphics utility used for drawing on the *Pmode* 3 screen. Full instructions are printed at the beginning, but it is useful to keep a list of commands. The commands are as follows

↑ Move up
← Move left
→ Move right
↓ Move down


R Colour red
G Colour green
B Colour blue
Y Colour yellow
P Paint an enclosed area a chosen colour
Q Clear screen
M Cursor on
O Cursor off
S Stop moving
W Move at 315 degrees
E Move at 45 degrees
Z Move at 225 degrees
X Move at 135 degrees
@ End

NB LINE 330 WHICH WAS INCORRECTLY PRINTED SHOULD READ 330 IF G$="Q" THEN X=0:Y=0:PCLS

Program notes

40-240 Prints instructions
260 Switches to graphics screen
290 Reads keyboard
300-470 Carries out input function-graphics screen maintained at all times
480-530 Draws the line on the screen
560-580 Draws cursor on screen, resets old position of cursor
610-730 Subroutine for painting an area a chosen colour

```
10 '**************
20 '*  COMP ART   *
30 '*  BY         *
40 '*  M.J.PERRY  *
50 '**************
60 CLS
70 PRINT"TO CONTROL THE LINE, USE THE
   FOLLOWING COMMANDS:-"
80 PRINT" W MOVE AT 315 DEGREES E''
   45    '' Z  '' '' 225    ''
   X  ''   '' 135    ''"
90 PRINT:PRINT"USE THE ARROW KEYS TO
   MOVE LEFT AND RIGHT. USE 'S' TO
   STOP THE  LINE"
100 PRINT:PRINT"PRESS SPACE-BAR TO
   CONTINUE"
110 IF INKEY$<>" " THEN 110
120 CLS
130 PRINT"CHANGE COLOUR BY PRESSING
   R(ED),G(REEN),Y(ELLOW) AND B(LUE)
140 PRINT"Q CLEARS SCREEN :O STOPS
   CURSOR:M STARTS CURSOR""
150 PRINT:PRINT"YOU START AT THE TOP-
   LEFT OF THESCREEN":PRINT
160 PRINT"PRESS @ TO END WHILE DRAWING"
170 PRINT
180 PRINT"PRESS SPACE-BAR TO CONTINUE"
190 IF INKEY$<>" " THEN 190
200 CLS
210 PRINT:PRINT"PRESS P THEN A COLOUR
   CODE TO   PAINT AN ENCLOSED AREA
   COLOUR"
220 PRINT"THE COMPUTER WILL PAINT THE
   AREAENCLOSED BY THE current foregr
   ound colour THE COLOUR YOUCHOOSE.
   THE COLOUR CHOSEN WILL  THEN BECOME
   THE FOREGROUND COLOR"
230 PRINT:PRINT"PRESS SPACE BAR TO
   CONTINUE"
240 IF INKEY$<>" " THEN 240
250 CLS
260 PMODE 3,1:SCREEN 1,0:PCLS
270 X=0:Y=0:C=1
280 ' DRAWING ROUTINE
290 G$=INKEY$
300 IF G$="P" THEN GOSUB 610
310 IF G$="R" THEN C=4
320 IF G$="C" THEN C=1
330 IF G$="Q" THEN   X=0:Y=0:PCLS
340 IF G$="B" THEN C=3
350 IF G$="Y" THEN C=2
360 IF G$="O" OR G$="M" THEN CR$=G$
370 COLOR C
380 IF G$="^" THEN A=0:B=-3
390 IF G$="@" THEN SCREEN 1,0:CLS:
   PRINT"BYE-BYE!":SOUND 100,2:END
400 IF G$=CHR$(10) THEN A=0:B=3
410 IF G$=CHR$(8) THEN A=-3:B=0
420 IF G$=CHR$(9) THEN A=3:B=0
430 IF G$="S" THEN A=0:B=0
440 IF G$="W" THEN A=-2:B=-2
450 IF G$="E" THEN A=2:B=-2
450 IF G$="Z" THEN A=-2:B=2
470 IF G$="X" THEN A=2:B=2
480 XX=X+A:YY=Y+B
490 IF XX>255 THEN XX=255
500 IFXX<0 THENXX=0
510 IFYY<0 THENYY=0
520 IFYY>191 THENYY=191
530 LINE (X,Y)-(XX,YY),PSET
540
550 IF CR$="O" THEN 580
560 V=2:IF C=2 THEN V=3
570 PSET(LX,LY,C):PSET(X,Y,V):
   LX=X:LY=Y          'CURSOR
580 X=XX:Y=YY
590 GOTO 280
600 END
610 REM FILL
620 QW$=INKEY$
630 J=0
640 IF QW$="R" THEN J=4
650 IF QW$="G" THEN J=1
660 IF QW$="B" THEN J=3
670 IF QW$="Y" THEN J=2
680 IF J=0 THEN 620
690 IF C=2 THEN N=1 ELSE N=2
700 PSET(X,Y,N)
710 PAINT(X,Y),J,C
720 C=J
730 RETURN
```

Compart
by M J Perry

Bingo

on Spectrum

This program is in two parts The latter will print bingo cards on the ZX printer and is linked within the main loop

The program is well documented with Rem statements and will run on a 16K Spectrum

Basically there are two routines 5000 which operates the printer and 100-320 which is the main loop

It is quite a simple program which should provide entertainment for all the family

```
  5 REM Bingo By J.W.Walsh
 10 GO SUB 700
 50 GO SUB 500
 99 REM [redacted]
100 DIM a(91)  FOR n=1 TO 90  L
ET a(n)=n. NEXT n  LET gone=90
104 REM [redacted]
105 FOR k=1 TO 90  LET , INT (R
ND*gone)+1  LET number=a(   LET
 a(  =0  LET gone=gone-1  LET fl
=0  PRINT PAPER 1,AT 11,30,"  ":
 BEEP .5,-20  FOR n=1 TO gone  I
F a(n)=0 THEN LET fl=1
110 IF fl=1 THEN LET a(n)=a(n+1
)
115 NEXT n
190 PRINT INK 7, BRIGHT 1, FLAS
H 1,AT 11,30,number  BEEP .05,nu
mber-40
200 LET y1=INT p(number)  LET x
1=p(number)-y1. LET x$=STR$ x1
LET x1=VAL x$(3 TO )
203 IF man=1 THEN GO TO 205
204 LET z$=INKEY$  IF z$="" THE
N GO TO 204
205 PRINT INK 1, PAPER 6, BRIGH
T 1,AT y1,x1,number
207 IF man=1 THEN PAUSE k
208 IF man=1 THEN LET z$=INKEY$
210 IF z$="1" THEN GO TO 300
215 NEXT k
220 INPUT "All numbers now out
of bag. ; LINE z$  GO SUB 600  G
O TO 100
300 PAUSE 100  INPUT " New game
(y)? ", LINE z$
300 IF z$="y" OR z$="Y" THEN GO
TO 320
310 GO TO 215
320 GO SUB 600  GO TO 100
499 REM [redacted]
500 PAPER 1  INK 6  BORDER 1. C
LS
505 LET x=20  LET y=4
510 FOR n=1 TO 11  PLOT x,y  DR
AW 215,0  LET y=y+16  NEXT n
515 LET x=20  LET y=4
520 FOR n=1 TO 10. PLOT x,y  DR
AW 0,160  LET x=x+24  NEXT n
525 PRINT INK 5,"    1 10 20 30
40 50 60 70 80"
530 PRINT INK 5,"  "'"  1"''" 2"'
'" 3"''" 4"''" 5"''" 6"''" 7"''"
8"''" 9"''"10"
540 REM ______________________
541 REM
542 REM [redacted]
545 DIM p(90)  LET x=0  LET z=0
550 FOR m=1 TO 9  LET z=z+3. LE
T y=0  FOR n=1 TO 10  LET y=y+2
 LET x=x+1  LET z$=STR$ y+"."+ST
R$ z  LET p(x)=VAL z$  NEXT n  N
EXT m
555 RETURN
557 REM ______________________
558 REM
599 REM [redacted]
600 FOR n=1 TO 90  LET y1=INT p
(n)  LET x1=p(n)-y1  LET x$=STR$
 x1  LET x1=VAL x$(3 TO )  PRINT
 AT y1,x1,"  "  BEEP .1,INT (RND
*24)+1  NEXT n  PRINT AT 11,30,"
  "  RETURN
603 REM ______________________
604 REM
700 BORDER 6. PAPER 5: INK 1. C
LS
705 PRINT AT 13,1,"
       "  LET z$="BINGO!". L
ET y$="By Jim Walsh. Oct.1982".
LET x$="Press '1' for new game!"
 LET w$="Press any key for new
number."
710 PRINT AT 1,12," ",  FOR n=1
 TO LEN z$  PRINT z$(n TO n),  P
AUSE 10  LET i$=INKEY$  IF i$<>"
" THEN GO TO 780
715 NEXT n  PRINT "  "
720 PRINT AT 7,5," ",  FOR n=1
TO LEN y$  PRINT y$(n TO n),  PA
USE 5  LET i$=INKEY$  IF i$<>""
THEN GO TO 780
725 NEXT n  PRINT "  "  PRINT AT
1,15,"
730 PRINT AT 10,0," ",  FOR n=1
TO LEN w$  PRINT w$(n TO n),  P
AUSE 5  LET i$=INKEY$  IF i$<>""
 THEN GO TO 780
735 NEXT n  PRINT "  "  PRINT AT
7,5,"
740 PRINT AT 13,0," ",. FOR n=1
TO LEN x$  PRINT x$(n TO n),. P
AUSE 5  LET i$=INKEY$  IF i$<>""
 THEN GO TO 780
745 NEXT n  PRINT "  ". PRINT AT
10,1,"
780 PRINT FLASH 1,AT 21,12;"Pre
ss any key!"  FOR n=1 TO 100. NE
XT n  GO TO 705
775 REM [redacted]
780 CLS  PRINT AT 10,3,"DO YOU
REQUIRE ANY BINGO"'''
      CARDS?"
785 INPUT "ENTER 'Y' or any. ",
LINE z$
790 IF z$="Y" OR z$="y" THEN GO
SUB 800
795 LET man=0. CLS . PRINT AT 5
,5,"Do you want an automatic"''"
    or a manual game?"  INPUT "E
nter 'a' or any. ", LINE i$  IF
i$="a" OR i$="A" THEN LET man=1
797 RETURN
800 CLS  PRINT AT 5,5,"Have yo
u plugged your"''"  printer in?
"  PAUSE 300. GO SUB 5000  RETUR
N
4996>REM [redacted]
4997 REM ______________________
4998 REM
4999 REM [redacted]
5000 LET number=0  BORDER 7  PAP
ER 7  BRIGHT 0  INK 0  CLS  INP
UT "Type in any 8 digit code. ";
""   ",a$  IF LEN a$<>8 THEN GO
 TO 5000
5005 INPUT "How many Bingo cards
 do you"'''"want? 2 X  ", LINE c$
  FOR n=1 TO LEN c$  IF c$(n TO
n)<"0" OR c$(n TO n)>"9" THEN GO
 TO 5005
5006 NEXT n
5010 LET card=VAL c$  PRINT AT 5
,0,"I am now going to print your
"' "   Bingo cards."  PAUSE 100
 PRINT AT 15,0,"Be patient"''"
[redacted]
5014 REM ______________________
5015 GO SUB 6000  LET number=num
ber+1
5020 CLS  LET j$="[redacted]"  FOR n=1 TO 5  PR
INT TAB 1,j$  NEXT n  PRINT . PR
INT  PRINT . PRINT  FOR n=1 TO
 9  PRINT TAB 4,j$  NEXT n
5026 LET p=1. LET o=5  FOR m=1 T
O 8  FOR n=1 TO 7 STEP 2  IF w(p
)<91 THEN PRINT AT n,o,w(p)
5030 LET p=p+1. NEXT n  LET o=o+
3  NEXT m
5032 REM ______________________
5038 GO SUB 6000  LET p=1  LET o
=5  FOR m=1 TO 8  FOR n=14 TO 20
 STEP 2  IF w(p)<91 THEN PRINT A
T n,o,w(p)
5040 LET p=p+1  NEXT n  LET o=o+
3  NEXT m
5042 REM ______________________
5043 PRINT AT 10,12,a$
5045 COPY  LPRINT  LPRINT TAB
12,a$  LPRINT  LPRINT
5050 IF number<>card THEN GO TO
5015
5058 RETURN
5999 REM [redacted]
6000 DIM z(15)
6003 FOR n=1 TO 15
6005 LET r=INT (RND*90)+1  GO SU
B 7000  IF y=1 THEN LET z(n)=r
6012 IF y=0 THEN GO TO 6005
6015 NEXT n
```

Continued on page 35



CP SOFTWARE
SUPER CHESS II
For Sinclair 48K SPECTRUM
THE BEST AT £7.95
Guaranteed able to consistently beat Sargon II and all other Spectrum chess programs !!
Plays a variety of openings e g French Defense
Sicilian Defense Ruy Lopez Queen s Gambit etc
Self Play Mode Analyse Mode
Recommended move option
CP SOFTWARE
Spectrum software
●● ORIGINAL SUPERCHESS ●● The Cheapest
French Defense Queen s Gambit Ruy Lopez etc Self play feature
48K Spectrum
16k ZX81 £4 95
●● BACKGAMMON ●●
documentation to enable beginners to learn the game
●● ZX DRAUGHTS ●●
●● SPECTRUM FORTH ●● NEW!!
●● SPECTRUM SPEECH ●●
Spectrum speaker and top 32k Ram.
SOFTALK I
SOFTALK II
●● SPECTRUM BRIDGE TUTOR ●● NEW!!
For 16k and 48k Spectrum
Beginners (40 hands)
Advanced (40 hands)
Also available from
WH Smith – Computer Branches
Capital Cameras Crawley
CP SOFTWARE, Dept. 3w, 17 Orchard Lane, Prestwood, Bucks. HP16 0NN
PROGRAMMERS – TOP RATES PAID FOR QUALITY SPECTRUM PROGRAMS
SEND YOUR MATERIAL FOR EVALUATION AND PROMPT REPLY
Home Computer Show
Manchester
April
THURSDAY 21 (12am — 7pm)
FRIDAY 22 (10am — 6pm)
SATURDAY 23 (10am — 5pm)
AT THE
Midland Hotel
PETER STREET
VISIT THE COMPLETE SHOW FOR THE HOME USER AND SEE
A COMPLETE cross section of all hardware and software available to the home user
A FULL RANGE of home computers priced from £50 upwards.
A COMPUTER ADVICE CENTRE run by independent experts for the answers to all your questions
WIN WIN WIN TWO COMPUTERS — one for you, one for a school of your choice — to be won at each show. FREE entry form with advance tickets
ADULTS £2.00 UNDER 8s & OAPs FREE 25% DISCOUNT for parties of 20 or more
COMING SOON
MAY BRIGHTON
JUNE BIRMINGHAM
Sponsored jointly by
Computing Today Personal Software
Personal Computing Today
Home Computing Weekly ZX Computing
PCWk
Send £1.00 Save £1.00
Home Computer Show
Please enclose SAE
Mr. Mrs. Miss
Address
ASP Exhibitions
145 Charing Cross Road
London WC2H 0EE
01-437 1002

```
6016 REM
6017 REM
6020 REM [redacted]
6025 DIM x(17)
6030 FOR n=1 TO 17
6035 LET r=INT (RND*32)+1: GO SU
B 7010: IF y=1 THEN LET x(n)=r
6040 IF y=0 THEN GO TO 6035
6045 NEXT n
6047 REM
6048 REM
6049 REM [redacted]
6050 DIM w(32): FOR n=1 TO 17: L
ET temp=x(n): LET w(temp)=100: N
EXT n
6053 REM
6054 REM
6055 REM [redacted]
6060 FOR k=1 TO 15: FOR n=1 TO 1
4: IF z(n)>z(n+1) THEN GO SUB 70
30
6061 NEXT n: NEXT k
6063 REM
6064 REM
6069 REM [redacted]
6070 LET c=1: FOR n=1 TO 32
6075 IF w(n)<>0 THEN GO TO 6090
6080 LET w(n)=z(c)
6082 LET c=c+1
6090 NEXT n
6092 REM
6093 REM
6095 RETURN
6096 REM
6097 REM
6999 REM [redacted]
7000 LET y=1: FOR k=1 TO 15: IF
z(k)=r THEN LET y=0
7005 NEXT k: RETURN
7006 REM
7008 REM
7009 REM [redacted]
7010 LET y=1: FOR k=1 TO 17: IF
x(k)=r THEN LET y=0
7015 NEXT k: RETURN
7016 REM
7028 REM
7029 REM [redacted]
7030 LET temp=z(n): LET z(n)=z(n
+1): LET z(n+1)=temp: RETURN
7032 REM
7033 REM
```

Singo
by J W Walsh

Sing

on Vic20

The program was written for the unexpanded Vic. It plays the well known song "I'd like to teach the world to sing" (in perfect harmony). The program uses two part harmony in soprano and alto clefs. The alto giving the bass walking pedal effect which I found to be quite realistic.

- line 100 sets the volume
- line 120 determines if the tune has been played three times as three-quarters of the song is the same tune
- line 120 determines if it is the end of the song or not
- the data lines give the values to be 'poked' in order to give sound generation

```
100 PRINT"[illegible]"
110 PRINT"I'D LIKE TO TEACH THE"
120 PRINT"[illegible]   WORLD TO SING"
130 PRINT"[illegible](IN PERFECT HARMONY)"
140 POKE36878,15
150 READA,B
160 IFA=6THENT=T+1:IFT<4THENRESTORE:
    GOTO150
170 IFA=7THEN210
180 POKE36876,A:POKE36874,B
190 FORD=1TO150:NEXTD
200 GOTO150
210 POKE36878,0:POKE36876,0:POKE36874,0
220 END
230 DATA 219,0,215,195,219,191,225,
    183,219,175,215,195,219,191,225,183,
    225,175
240 DATA 228.201,231,0,228,201,231,
    0,228 201,0,0,0.147,231,0,228,175,
    231,0,235
250 DATA 175,231,0,228,175,231,0,235,
    175,231.0,225,163,228,0,163,219,0,
    225,175
260 DATA 225,0,0,135,0,6,6
270 DATA 231,0,231,0,232,0,231,0,225.
    135,225,191,0,183,0,175,0,145,225,
    191,225
280 DATA 0,225,183,223,175,225,0,201.
    147,201,147,0,147,231,147,201,175,
    231,0
290 DATA 235,175,231,0,228,215,231,0,
    235,175,231,0,225,163,228,0,225,163,
    219
300 DATA 0,225,195.0,195,7,7
```

Sing
by D Charles

Hypnotic

on Vic20

The second program creates an impressive screen display. The program uses four of the Vic control registers to alter the position and size of the screen. They are

Poke 36864 0-255 controls start of screen from the top

Poke 36865 0-255 controls start of screen from the left

Poke 36866 0-255 number of columns on screen

Poke 36867 0-255 number of rows on screen

- lines 1010 1070 make the screen smaller
- lines 2010 2070 make the screen larger
- lines 3000-3030 create random reverse fielded spaces which change within the two main subroutines.

```
100 REM-HYPNOTIC
110 REM-BY DAVID CHARLES
120 GOSUB360
130 POKE36878,15
140 POKE36869,INT(RND(1)*128)+1
150 GOSUB180
160 GOSUB270
170 GOTO140
180 REM-CLOSE
190 FORI=0TO22
200 POKE36876,230+I
210 POKE36864,12+I
220 POKE36865,38+I
230 POKE36866,150-I
240 POKE36867,174-I*2
250 NEXT I
260 RETURN
270 REM-OPEN
280 FORI=22TO0 STEP-1
290 POKE36876,230+I
300 POKE36864,12+I
310 POKE36865,38+I
320 POKE36866,150-I
330 POKE36867,174-I*2
340 NEXT I
350 RETURN
360 FORI=0TO506
370 POKE7680+I,160
380 POKE38400+I,INT(RND(1)*2)
390 NEXTI
400 RETURN
```

Hypnotic
by D Charles



World of fantasy

The Midnight Programmers, after the day's concentrated toil at designing their new machines, would finally relax and see themselves in a world of fantasy. Adventure had swept through American computers since its beginnings several years before, and was now standard fare on large company mainframes. With computer time so expensive, management would eventually ban the use of their hardware for this pastime, but for now, it captivated the minds of the programmers.

Drawing heavily on *Dungeons and Dragons*, a role-playing game devised by Gary Gygax and Dave Arneson in the early 1970's, adventures (the plural was later dropped) was originally written in Fortran. As microcomputers became more and more common, so adventure was adapted for their use.

The original format of the game has remained the same to this day, although there are now also many variants. A couple of weeks ago I started a game on a mainframe, a PDP-11/24, which I have asked your help in solving — this will, I hope, give you an idea of some of the flavour of the original, which is as powerful now as it was then.

Throughout all the variations, however, be they graphic, text, or a mixture of both, the basic idea is still to solve a series of riddles or conundrums, while doing battle with various unsavoury monsters. In the original, all this took place in some unspecified network of catacombs, but authors now feel the need to site their adventures in ever more exotic locations, or, as in Melbourne House's *Hobbit*, to base their programs on existing works of fantasy.

Next week, I will discuss some of the well-tried methods and techniques for getting through the game — though many of you may not believe that there is any system to this frustrating pastime!

In the meantime, can anyone help Paul of the YMCA, Birmingham? He is stuck in *Mission Impossible* for the Vic20, written by good old Scott Adams, of whom more later. Entrance to the power room seems to be causing a problem for Paul, and he would appreciate any help — just drop me a line and I will pass on any tips you might have.

If you are a Vic20 adventure fan, you might also be able to pass along some hints for Ian Bingham of Merseyside who is playing *Moon Base Alpha*. He is trying to launch a missile at a comet that is on a collision course for the Base. How does he power up the computer, is what he would like to know.

Adventureland, again for the Vic20, has Tresco Richards completely stuck, trying to get past the bear to the treasure. Giving *Golden Honey* to the bear makes him fall asleep, but Tresco can't get the *Honey* back, which is a shame, as it is also *Treasure*! Help, please.

And don't forget — *adventuring is not just a load of Kobolds!*

● Many of you have asked in your letters if there are certain words or techniques to be used in adventuring on computers. Well, yes — there are several that have become fairly standard throughout all the versions available. This is an occasional corner to give the adventure dictionary an airing. The first word is one that everybody uses, some more than others: Help.

Type *Help* when you are really stuck, and the computer should (Ho! Ho!) come back with some clue or hint for you. If the author feels benevolent, it will help, but more than likely, the clue will be rather obscure and probably just another problem to be solved. Work this one out, however, and you are on your way to the next location. ■

[illegible] Adventurers alike. Each week Tony Bridge will be looking at different Adventures and advising you on some of the problems and pitfalls you can expect to encounter. So if you have an Adventure you want reviewed, or if you are stuck in an Adventure and cannot progress any further, write to Tony Bridge, Adventure Corner, *Popular Computing Weekly*, Hobhouse Court, 19 Whitcomb Street, London WC2 7HF.

Blind Alley

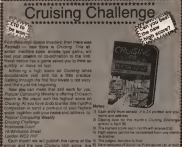
Blind Alley is a game of strategy. In order to win you must outwit the computer, using your craft to fence in and finally destroy the enemy pursuit vehicles. But watch out for the solid trail left by your opponents — one touch is fatal!

Each month *Popular Computing Weekly* is giving away £10 to the player with the highest score on *Blind Alley*. To enter this month's competition simply send in a copy of your score and the code at the bottom of the score table together with your name and address, to

Popular Computing Weekly
Blind Alley
Hobhouse Court
19 Whitcomb Street
London WC2 7HF

Entries for this month's competition close on May 31.

■ *Blind Alley* for the 16K and 48K ZX Spectrum is available through W H Smith and leading computer stores for £4.95. It is also available mail-order from Sunshine Books, Hobhouse Court, 19 Whitcomb Street, London WC2 7HF.



Cruising Challenge

First there was *Space Invaders*, then there was *Pacman* — now there is *Cruising*. This all action machine code arcade type game, will test your powers of co-ordination to the limit. Never before has a game asked you to think so quickly, or move so fast.

Achieving a high score on *Cruising* takes considerable skill, and not a little practice. Getting through the first four levels is not easy and that's just the beginning.

Now you can make that skill work for you. *Popular Computing Weekly* is offering £10 each month to the player with the highest score on *Cruising*. All you have to do to enter this month's competition is send a print-out of your highest score together with your name and address to:

Popular Computing Weekly
Cruising Challenge
Hobhouse Court
19 Whitcomb Street
London WC2 7HF

Each month we will publish the name of the winner and the new *Cruising* high score. Are you good enough to accept the Cruising Challenge?

The highest score sent in so far this month is 8244 from *Neil Saloway* of 31 Avenue Road, Wallford, Dorset. If you have a higher score you could still win this month's £10 — but hurry, entries close on April 30.

Notes

1) Each entry must consist of a ZX printout and your name and address.
2) Closing date for this month's *Cruising Challenge* entries is April 30.
3) The highest score each month will receive £10.
4) High scores cannot be transferred from one month to another.
5) The judges' decision is final.
6) No employees of Sunshine Publications Ltd or their families will be eligible to enter the *Cruising Challenge*.
7) *Cruising (on Broadway)* for the 16K and 48K ZX Spectrum is available through W H Smith and leading computer stores for just £4.95. It is also available mail-order from Sunshine Books Ltd, Hobhouse Court, 19 Whitcomb Street, London WC2 7HF.

CLASSIFIED

Semi-display — £5 per single cc
Trade lineage — 20p per word
Private lineage — 10p per word

CALL *DIANE DAVIS* ON *01-839 2476* FOR SEMI-DISPLAY ADVERTISING

GAMES SOFTWARE

Elephant Software.

PUZZLES FOR THINKERS
ON ZX SPECTRUM
Free postage and packing
VANQUISHER 16K
The missing persons man set. In the travel baffler marrange. If you can the jumbled letters of the word VANQUISHER via tracks and sidings. Score by time and moves. £3.95
PERAGRAM 16K
Can you rotate the 16 letters around into their correct order without getting perplexed. Score by moves. £4.95
ELEPHANT SOFTWARE
41 HAYMILL ROAD
BURNHAM BERKS SL1 6NE

PROGRAMS FOR VIC, Dalemes and five more. To sell or swap. Ring (0751) 74118 weekends only

SPECTRUM CASSETTES, £3 each! 12 games. Pacman Hangman Fools Colditz Racer Othello Space Collector and Adventure. J. Leach 8 Cirdsslord Close Hadleigh Suffolk

1K ZX81
MAZE GOBBLER
AT LAST A FULL FEATURE 1K VERSION OF THE FAMOUS ARCADE GAME
* SMOOTH FAST ACTION MACHINE CODE
* INTELLIGENT MONSTERS
* ENERGY PILLS
* ON-SCREEN SCORING
* SPEED UP ACTION
Gift Tape with 'SUPER BREAKOUT' £3.50
Score Software (PCW) 37 Consallie Lane Cheadle Cheshire 061-428 7421
DEALER ENQUIRIES WELCOME

JUPITER ACE games software five programs for £4.95 in Forth/MC S.A.E. for details and rourne to save UDGs. J Kennedy 32 Bayview Road Bangor Northern Ireland

LYNX SOFTWARE Space Thief + free character generator £3.95 Ring Sian 01-472 6935 after 6 pm

CLASSIFIED ADVERTISING RATES:

Line by line: For private individuals 10p per word minimum 10 words
For companies traders and all commercial bodies 20p per word minimum 20 words

Semi-display £5 per single column centimetre minimum length 2 cm (Please supply A/W as PMT Or supply rough setting instructions.)

Conditions: All copy for Classified section must be pre-paid. Cheques and postal orders should arrive at least two weeks before the publication date

If you wish to discuss your ad please ring Diane Davis 01 839 2476

DRAGON 32 Gamesline. Three games for the price of one. Missile Command (with speech) E.T. (help rescue E.T. from the planet earth) and City Defence. All in full colour. High Resolution Graphics and Sound. Send £4.95 to Fantasy Software 22 Winsten Avenue Stocksbridge Sheffield S30 5LA

DRAGONQUEST
Over 40K of adventure in two parts. Escape From The Haunted House and Explore The Garden To Find The Magic Chalice
Both parts on tape £4.95 J Stuhler 25 Angela Road Horsford Norwich Norfolk

ZX81 COMPLETE, 16K, Arcade cassette Scramble Invaders Galaxians Asteroids Frogger Pacman Send £3 to R Wright 234 Kew Road Richmond TW9 3JX

SPECSOFT 64K, Spectrum adventure fits into 16K Spectrum in four parts fight trolls witches, etc. 150+ locations plus Missile Command both £3 57 Everard Avenue Sheffield

ATTENTION! Quality games software for ZX81 with/without OS character board. Send sae for free catalogue to Mark Andrews 44 Eaglesham Road Newton Mearns Glasgow

JUPITER ACE SOFTWARE available now Gamestapes one two and three for the unexpanded ace (Four games on 1 & 2) £4 each (Two games on 3) £2.50 Also Firebird and Maceman for 16K machine £4.50 each excellent arcade action graphics. Sae for catalogue. Cheques to Voyager Software 9 Burton Drive Wrexham Clwyd

★ ORIC GAMES ★
1 RUMBLINGS OF INTRIGUE. A 40k adventure game. Be a fighter magician priest or dwarf braving a host of monsters armed with a choice of weapons and try to locate the Seal of Power in a large random labyrinth £5.50 (inc p&p)
2 STOCK EXCHANGE. Buy and sell shares in this superbly presented simulation of high finance. For 1 to 4 players. Plus ETCH-A-SKETCH Draw with cursor shading screen save etc. The two for £4 (inc p&p). Cheques/POs to A & L SOFTWARE, 86 FFORDD LLYWELYN LITTLE ACTON WREXHAM CLWYD

SWAP THE COUNT for any other adventure game Vic20 Tel Orpington 37990

RUBIX REVENGE, 48K Spectrum full colour hi-res save puzzle facility and solving 30 moves £5 D Staples 32 Allenby Drive Greenhill Sheffield

SPECTRUM GAMES Three fast beautiful compulsive 16K experiences Pyramid Panic Beanstalk, Kong. Stunning hi res multicolour graphics sound and music. On one illustrated cassette £3 Tim Boone 1 Mercury Close Southampton

ZX81, superb 16K arcade cassette Invaders Scramble Asteroids, Frogger. All m/c fast full screen unbelievable price. Send £1 to R Wright 234 Kew Road Richmond TW9 3JX

PET BANDIT, fruit machine emulation. Advanced features such as nudge hold sound £2.50 from J Deakin 40 The Rock Telford TF3 5BH

VIC20 ALIEN CARTRIDGE, Bug-byte Cosmiads and Panic cassettes. Innovative computing book for sale £20 Telephone King's Lynn 828872

SWAP VIC20 Pirates Cove for any other Scott Adams adventure. Minster Sheppey (0795) 875003

LYNX 48K, Labyrinth 3D maze game Chancellor run the country for 10 years £4.50 each. Machine code programs wanted Tel 0273 422920

SWAP STAR BATTLE for Rat Race. Tel 01 579 2129

SPECTRUM Gamestape one (48K) Adventure Island plus Munchman five colourful and addictive games in Basic and M/C Only £4.95 Cheques to M Levers, 45 Lilesfield Avenue Barnwood Gloucester

BUSINESS SOFTWARE

EARN MONEY using your computer to run a real business. Sae for details BM Velvet 27a Old Gloucester Road, London WC1N 3XX

COMPUTER AIDED DESIGN
AT LAST there is a program for the 16K or 48K SPECTRUM which will enable you to specify and display objects in 3 DIMENSIONS
Wire frame objects can be rotated. Both 3 dim and viewed from any position. ENLARGE REDUCE COLOUR MODIFY PRINT — and all with REAL PERSPECTIVE
DEALER enquiries welcome — CASSETTES GUARANTEED
£8.95 to EMSOFT
27 Lennox Glen
Wakefield West Yorkshire

FLEXICALC
The really versatile spreadsheet program for the 48K Spectrum
See review in this issue
£9.95
FLEXIGEN/FLEXICON
Both programs for £6.95
FIGARO II
Now with full colour extended graphics including pie charts and cluster bar charts £14.95
SAXON COMPUTING
8 St Catherine's Close Leconfield Beverley Humberside
Access and Barclaycard orders welcome
Tel 0401 50607

VIC20 PRINTING SERVICE
Send your program on tape and we will return with printer listing £1.75 N. Hayles, 44 Atwood Road Didsbury Manchester M20 0TD
All cassettes returned by recorded delivery

EDUCATIONAL SOFTWARE

PASS FRENCH O Level 50 verbs in five tenses for 48K Spectrum. Random selective testing or listing of verb in chosen tense £3.95 W Thies 28 Primula Drive Norwich NR4 7LZ.

SCROLL IN ANY DIRECTION on Spectrum. Simply merge to your program. On cassette. £2.95 Bobker 21 Chadderton Drive Unsworth Bury Lancs

Here's my classified ad.

(Please write your copy in capital letters on the lines below.)

Please continue on a separate sheet of paper

I make this .... words, at .... per word so I owe you £ ....

Name ....

Address ....

....

....

Telephone ....

Please cut out and send this form to Classified Department *Popular Computing Weekly*, Hobhouse Court 19 Whitcomb Street London WC2



UTILITIES

SPECTRUM FORTH

On cassette. Most timings actually beat than the Jupiter Ace. All Forth structures. Colour, high resolution graphics. Comprehensive instructions. Immediate despatch. No previous knowledge required. Order as SP16H (16K) or SP48H (48K) £5.95 to Mike Hampson, 7 Hereford Drive, Otley, Leeds LS21 1JP

BBC SOFTWARE, 32K Definer. Create characters on 8 x 8 grid and save VDU23 commands as program lines. Machine Code Copier: make backups of M/C programs. Both on one cassette £3.95 inclusive. Cheques payable to K Tayler, 14 Yarmouth Road, Lowestoft, Suffolk NR32 4AJ

Spectrum 16K 48K
MULTI-CHARACTER DESIGNER
- Design mosty as SINGLE, DOUBLE (Vertical and Horizontal) and FOUR Square characters
- Menu driven ● Save/load Utility
- Display LPrint data statement values
- Simultaneous actual size display

Tape only £3.50
Send cheque/PO to:
R & J. REGAN (SOFTWARE), 86 Derbam Way, Harrogate, North Yorkshire HG3 2TA

TELETEXT ON YOUR SPECTRUM. ZX TEXT 83 lets you create your own teletext system (900 pages). Similar to Ceefax and Oracle. Full colour graphics, flashing, inverse video, 24-hour clock with alarm. Engineering test pages — it's all here. Cassette £4.95 complete with sample system, full instructions and 12-month guarantee. Details (SAE) Iain Stewart, 17 Torry Drive, Alva, Scotland FK12 5NQ.

EDTASM + TANDY Colour Computer editor/assembler Rom pack six months old, £25. Tel Tewkesbury 294681

SPECTRUM "SNIFFER" Reads tapes and prints out program name, length in bytes and start address, Machine Code and Basic! Also gives auto run line number. £2.50 from AWA, 50 Dundonald Road, Didsbury, Manchester

COMPUTER RATING METHODS

Put your computer to good use for pleasure/profit during the 1983 flat racing season. For users of the most up-to-date professional METHOD ever put on sale to the racing public, giving you top-rated selections on your own computer. Programmed in BASIC for units 16K/48K. No figures to keep and no maths involved, easy to understand. Write for details enclosing a S.A.E. to

C.R.M., 18 Langdale Place, Newton Aycliffe, Durham DL5 7DX

505 COPY Lets you stop and copy any previously unstoppable Spectrum cassettes. On cassette £2.95. Bobker, 69 Chadderton Drive, Unsworth, Bury, Lancs

Spectrum Owners
First of all you had to save up programs by display tape-to-tape copies. Now KEYSOFT present:

THE KEY

Programs up to 9K (5K for 16K Spectrums) can be copied. Order THE KEY for £5.95 (mail order only) from
KEYSOFT, Dept PCWk,
8 Bruce Grove, London N17 6RA
KEYSOFT advise users not to infringe the Copyright laws

DRAGON 32 and Tandy colour copies most machine code tapes. £3 for details. S.A.E. to 1 Great Park Close, Southwell, Notts

HARDWARE

COMMODORE 64
£264.00 (excl VAT)
64 Programmers Ref Manual £10.95
Tel Chris Gurney, Dave Walsh or Floyd Paterson
Tel 01-969 4918 or send SAE
Image Science Micro Computers Ltd
10A Fraelon Rd, London W10 5TH
or cheques P.P. (add 15% VAT and £8 for p&p Securicor delivery)
Read Frame 4800008 (a) for latest software and hardware information and graph

LINE PRINTER SEVEN, 80/40 columns (software selectable), hires graphics, both serial and Centronics parallel. Boxed, as new with paper. Cost £240, only £160. Tel (0532) 581811

VIC20 and cassette player, 5 months old, plus programmers reference guide, possible £150 ono. Tel Clevedon 877226

SPECTRUM MEMORY, Dataonics expansion unit 16K to 48K £25. Tel 0625 525699

EPSON MX-80T, TRS-80 interface, 2000 sheets plain fanfold paper, as new £250 complete. Tel 01 843 9036

ATARI 400-800 32K Ram board (easy upgrade) easily fitted £60. Tel Loughborough 267992

VIC EPROM PROGRAMMER. Programs reads verifys checks for blanks 27/2516 — 2K 27/2532 — 4K 2764 — 8K complete plug-in unit + instructions and cassette software. Total price £35 inclusive. P P J Projects, 31 Pilkington Road, Radcliffe, Manchester M26 0PF

ZX81 High Res Graphics Unit
£32 (excl VAT)
Tel William Haynes 01 965 6012
Tools for Living
Notting Dale Technology Centre
191 Freston Road, London W10 6TH
Cheque/PO (add 15% VAT) plus 75p p & p

ZX81 16K, £25 of software tapes, leads, manuals etc, excellent condition, £50 ono. Huntingdon 810772

INTELLIVISION 16-BIT PROCESSOR, with four Rom games, two of which have leads synthesis, worth over £200, will accept £95 ono. Tel 01-950 2372

DUST COVERS available for any computer, printer etc. BBC, TI, Epson £3.95, Dragon, Atari, Vic20 £2.95, Sharp MZ80AK £4.95. For others please phone or write to Sherborne Designs, Victory House, 6A The Rank, North Bradley, Trowbridge, Wilts. Tel 02214 4425. Also made to measure service. Dealer enquiries welcome. Access and Barclaycard

BROKEN JOYSTICK?
STRONGER joystick insert replacements supplied with full fitting instructions. 3 YEAR GUARANTEE
£2.50/pair inc p&p
SOFTWARE FOR ATARI (TM) 400/800
All cassettes under £5
send s.a.e. for lists
Computer Supplies (PCW)
146 Church Road
Boston, Lincs PE21 0JX

16K RAM BOARD (ex 400) £30. 62 Hey Street, Spring View, Wigan

VIC20 OWNERS
DON'T BE ROBBED
Make your Vic20 guard you and your property while you are asleep
A 16 line Interface Kit uses the fully programmable line independent of the main 1
Many other uses. Software examples provided with kit. £19.95 inc VAT, P&P
Cheques etc. to Cleveland Interface, 18 Chelmsford Avenue, Fairfield, Stockton Co. Cleveland

MAPLIN HOME ORGAN requires tuning/finishing, value £450. Will swap for computer equipment, same value or W H Y ? Tel (0442) 54058

SWAP CANON A1 CAMERA with zoom lens + extras, value £250. Want computer approximately equal value. Tel 0261 423787

SHARP MZ80, immaculate condition, sound, 50 games, built in screen + cassette recorder £466 ono. Tel Mansfield 25444

SHARP MZ80K 48K, much software, magazines, books, user group notes + other useful items, £295. Tel 078A 208148

32K PET COMPUTER (old Rom) complete with one megabyte computhink disc, tape unit + IBM Golfball typewriter-printer + all leads. Price including 30 discs containing 100 games + general programs + extensive documentation £700. Tel 06646 364 (day) 06646 6314 (evenings)

16K ZX81 + six cassettes + magazines £65. Tel 0404 885187

48K SPECTRUM including Flight Simulation, Time Gate, Orbiter plus 11 more software cassettes and recorder £180. Call 041-634 1094

PROM SERVICES
ZX HARD
and SOFTWARE

ZX81	
8K Eprom board & Eprom 1 or 2	£37.50
Eprom 1 40 routine toolkit	£18.00
Eprom 2 Rapid load/save	£18.00
Eprom 4 20 routine m/c monitor	£10.00
Eprom 5 Z80 disassembler	£10.00
Motherboard — 3 slot	£16.95
Graphics board inc 4K of Eprom	£24.00
SPECTRUM	
Eprom board	£18.50
16K Ram Pack adapter	£3.50
Motherboard — 3 slot	£16.95
I/O board (Spectrum or ZX81)	£19.00
Audio board (Spectrum or ZX81)	£21.00

Many other ZX products available. SAE for list
EPROM SERVICES, 3 Wedgewood Drive, Leeds LS8 1EF (0532) 667183

ZX81, serial extension leads 2m £1.50, also made to measure. K Oakley, 102 Ruxley Road, Bucknall, Stoke-on-Trent, Staffs

MICROLINE 80 PRINTER. RS232 interface, 14 months old, excellent condition, £200 ono (Knutsford area). Tel 0582 830277

NOW! TRS 80 16K Level II Model I + disk drive + Epson Printer MX80 F/T3. C. Huntley, 1 Birch Hill, Llangollen, Clwyd

SPECTRUM 48K board plus eight tapes of games etc worth approx. £50, £165. Tel 099 389 700 nr Woodstock, Oxfordshire (Evenings, weekends)

ZX81, 16K with DK Tronics Graphics Rom, books, tapes £75. Tel 01-360 6850

VIDEO GENIE, 16K + loads of software included: Labyrinth, Saucers etc. Books included £150. Tel 01 958 9596

SWAP super expander, Myriad Commands for 8K. Also Star Battle, Asteroids for any adventure cartridge. Tel Buckland St. Mary 213

UK 101 SOFTWARE for the unexpanded or expanded 101, send for complete list. Mr N Weir, 27 Devonshire Park, Bideford, North Devon

CARTRIDGES TO SELL, adventure cartridges £17 each, games cartridges including Jelly Monsters, Avengers, Cloud Burst all £15 each, also cassette software to swap. Tel 01-387 8751

SPECIAL VIC20 5K internal memory + 8K expansion. High res Rom Machine Code monitor. C2N tape, books, software including Backgammon, Adventureland, cost over £420, accept £250 ono. Tel 061-431 3653

CLUBS

ORIC-1 OWNERS Tangerine created Oric-1, now TUG creates the rest. An independent users group with a solid reputation for progressive system support. Monthly newsletters, meetings, software, hardware reviews, advice and lots more. We have a proven record of performance on our system. Join TUG. You'll like us, we do! Send £1.00 + S.A.E. (A4) for sample newsletter and details. Tangerine Users Group, 1 Marlborough Drive, Worle, Avon BS22 0DQ

HELP Sharp MZ80K and MZ80K users. We have just formed a computer club in the Merseyside area and we are very short of software. We would be very glad of any software you could send us and we would return a cassette of our software. Some of us also have discs and printer and we would be glad to do list prints for you people without printers. Just send us your program on tape or disc and a large (S.A.E.) to 60 Thomondeley Road, Great Sutton, Ellesmere Port, L66 7BJ

ATARI 400/800 software club, largest in the country. S.A.E. for details. Midland Games, 48 Read Way, Bishops Cleeve, Cheltenham 0242 674960, 6 pm–9 pm

DEALERS

DRAGON SALES AND SERVICE
West Devon Electronics
15 Station Road
Horrabridge, Devon
Tel Yelverton (0822) 853434
Fast reliable service. Open some evenings. All repairs carried out in our own workshop

WANTED

A word of advice to Basic/Machine Code Programmers. Are you wasting your carefully thought-out programs on companies who fail to realise their market potential? We at Dial Grove Ltd are seeking good quality original De-Bugged Games, Utility, Educational and Business Programmes for ZX81 (1K 16K) and Spectrum (16K–48K). We are offering an attractive remuneration package for the right programs

Write to us at
DIAL GROVE LTD
10a JAMES STREET
COVENT GARDEN, LONDON WC2
You will be pleasantly surprised by our literature

WANTED TRS 80 32K extended or Mk III Basic Printer if price right. Kingham 0582 890423

FAIRS

Computer Swap 01-930 3266

Free readers entries to buy or sell a computer
Ring 01-930 3266 and give us the details

Spectrums for sale

ZX SPECTRUM 48K and over £150-worth of software and books etc, £225 Tel Hemel Hempstead 49395

ZX SPECTRUM 48K, £70-worth of software tape recorder also of magazines mini amp etc, bargain at £170 ono Tel 2447

16K SPECTRUM hardly used all leads, original box £15 of software 2 additional books, £118 Tel 0608 685369

SPECTRUM 16K, £110 one 01-397 3096 (7 pm)

48K ZX SPECTRUM, 8 months old + compatible cassette recorder £155 £110-worth of software + £20 of magazines £75 Tel 061 434 2621

16K SPECTRUM, 1 month old as new substantial amount of good software £130 Tel Huddersfield 29355

NEW 48K SPECTRUM + software, £170 ono Tel Bordon 2745 after 5 pm.

48K SPECTRUM, 2 months old + time gate VU 3D VU file + more, £178 Tel Orpington 23466

48K SPECTRUM assembler machine back deck, 5 rolls of printer paper Hobbit space invader chess flight simulation with extras worth £258 selling for £200 Tel Dorset, Tarrant Hinton 240

SPECTRUM 48K, as new numerous software including time gate chess flight simulation and others + books, £225 Tel 01-357 4376.

48K SPECTRUM, with printer + 2 rolls paper as new including all leads manuals + cassettes £205 Tel 0734 796588

48K SPECTRUM + £115 software + printer + £80 Spectrum books + magazines, value £450 ask for £260 ono or swap for BBC Tel 01-738 0481 (4-9 30 pm) ask for Jenny

SPECTRUM 48K, with cullard cond still case Sharp cassette recorder + software + manual £200 Tel Hitchin 731249

SPECTRUM 48K + printer from warehouse unopened 9 rolls paper Dkutn keyboard Sharp tape alts of business/ games software books £360 will services split. Tel 01-892 1473 (6 pm)

SPECTRUM 16K mint condition plus over £100 software may be sold separately £115 ono Tel Oban 0631 22205 (David) after 5 pm

48K SPECTRUM and complete Rom printout and printer £200 Consider part-exchange ZX81 plus cash Reading 0734 21286 after 6 pm

ZX SPECTRUM 48K, or swap for Lynx + tapes zinalin as new £250 of software Pascal Hobbit Tel Kegworth (05087) 2807

SPECTRUM, 48K (owner emigrating must sell) £140 01 551 0382

ZX81s for sale

ZX81 plus 16K, two months old video inverse and PSU all leads plus £10 of books and sol other cassettes all original boxes £80 ono Tel Waltham Cross 28173

ZX81 16K + tape recorder + books mags + cassettes £80 ono 48 Beech Avenue Brentford.

ZX81 with unused 16K Ram + printer games books and TV etc, all for £80. (Fuller) Tel Ware 2582 (evenings only)

ZX81 in DKtronics case plus keyboard hardly used £35 CAPS 16K rom pack £10 Qsave £8 Afmic £20 Compucalc £4 pocket book, £3 cassettes are for £3 software £1 Quick sale wanted. (0858) 822509 after 5 pm

ZX81, File 60 keyboard, 16K, £80 of software Black Crystal Flight Simulation, £80 ono 01-397 3096 (7 pm)

ZX81, 16K, Dectronics keyboard with numeric pad software and mags £80 ono Tel Hornchurch 53426 (6 pm)

ZX81 + 16K **RAM PACK** + software £35 ono Tel 01-571 2870.

ZX 81 16K, £80 of software. 4 months guarantee left to run + manual + leads £90 ono Tel Farnborough 28178 after 6 pm

ZX81 16K basic + £100 working software + books, £100 ono. Tel Norwich 863480 anytime.

ZX81, 16K, full size keyboard, 3D Defender £70 Tel 01-573 1564

ZX81 16K + £108 of software + leads manual + non-wobble gadget, good condition, £85 ono Tel 050-270 339 Matthew

ZX81 16K RAM, £20 of software + magazines £80 9 months guarantee still left. Tel Romford 21310

16K ZX81 with Fuller keyboard software manuals + mags £75 ono. Tel 803 4437

ZX81 1K with some software + magazines £25 ono Tel Chertsey 61516

ZX81, 16K, + games, £75 ono Tel Stanton St John 805 (anytime)

ZX81 16K leads manual 5 months old still under guarantee excellent condition 3 tapes including Psion chess and flight simulation 12 Sinclair magazines, 1 basic worth over £100 £75 ono Tel Brentwood 0277 222617

ZX81 16K + Kayde professional keyboard including repeat key + PS keys set + £45 software including Mazogs, 3D Defender etc £90 Tel Crewkerne (0460) 74667

ZX81, 16K boxed, £45 ono plus £100-worth of software to be sold at half price Tel Norwich 863480

16K ZX81 with Fuller keyboard + £80 software including 3D Monster Maze + Black Crystal £100 Tel M Sands, 771 0466

16K ZX81, + software perfect condition only 8 weeks old, £73 ono Tel 061-633 0658

ZX81, 16K Ram + keyboard + software + manual etc £75 Tel Crayford 524017

ZX81, 16K, DK'tronics keyboard + case cale recorder with power + computer leads £80 software + magazines worth £200+ sell for £100 ono Tel 674 0781 (after 5 pm) Ask for Andrew or Philip

ZX81, 16K Fuller SD42 keyboard manual leads + software £70 Tel 866 7222

ZX81, 16K proper keyboard DK Tronics graphics Rom user definable graphics £75-worth of games £185 Tel 460 2761

Commodores for sale

VIC20 — Starbattle £12 and Introduction to Basic, Part 1 £8 Tel Penn 5192

COMMODORE VIC20, Physics and Chemistry Revision, ???????? £7 50 each (mint condition) Johnstone (Renfrewshire) 21866

VIC20 + 7 slot Arlon expansion unit + 16K + 8K + super expander + m/code + programs and cartridges £200 worth of cassette and cartridge games, books Vic Revealed + programmers guide and worth £650 plus Accept £430 or swap for Basic P+I Commodore 64 Tel 01-673 8885 (Middlesex)

VIC20, £117 cassette unit £30 16K pack £42, 3K pack £15 joystick £6 Mynad Chess, Startrek, Vic Panic £24 dust cover £2 only 3 months old mint condition will sell for £225 complete Tel 01-460 7886 (Bromley)

VIC20 with cassette, joystick, introduction to Basic Part 1 Jelly Monsters, and Star Blade Shark Attack £150 ono High Wycombe 31626 evenings.

VIC20, Super expander 8K mother board cassette deck £80 of software + books, selling for £250 Tel 01-806 8148

VIC20, recorder super expander £210 ono + television £30 ono Tel Callerham 44646 (5-7 pm)

VIC20, £100 of software 3K Ram/ Eprom, Informleash for Vic + books + 2 Vic joysticks £70 Tel 0274 677647

VIC20, hardly used and fully boxed £100 ono Tel 01-527 0077

COMMODORE 64 tape unit, one month old in perfect condition, two years guarantee £340 Tel. Rajah 7225727

COMMODORE 64, C2N cassette deck, PRG + software, two months old excellent condition, £360 ono. Tel: (0202) 891887

VIC20, cassette unit, joystick, Pacmen cartridge, Invaders, Scramble, Centipede Asteroids, £150 Tel Ascot 21180

COMMODORE 64 Tel 0684-60890

VIC20 16K Ram pack, £35 Also 3K Ram pack, £20 Tel 06958 38564 ask for Joel

FOR SALE VIC20 cassette deck super expander joystick Intro to Basic Jelly Monster Omega Ray £56 of software cost over £200 new will sell for £150 Tel Linlithgow 842709

VIC20 with cassette player joystick, 16K expansion adventure Rom over 30 programs £190 ono Tel Cranleigh 272434

COMMODORE VIC20 with C2N cassette unit and 16K memory expansion 20 software tapes and 3 cartridges. Offers to 01-468 7277

COMMODORE 8K Ram cartridge £25 Rat Race cartridge £15 Omega Race £20 Tel 0442 58200

VIC20 Quiz Master plus Tomb of Drain 16K Also Tornado and Asteroids will swap for any Autogehast cartridge or Gorf Tel Odiham 3445 after 4 pm

SWAP VIC20, cassette recorder Abacrostic for BBC A Model Tel Hastings 714186 (Kourosh)

VIC20 cassette unit, 3K programs and 16K Ram over £100-worth of software £125 word processor Best offer or will separate Tel Maidstone (0622) 813794

VIC20, cassette unit, super expander cartridge, lots of software 1 year's editions of Your Computer magazine joystick, swap for BBC Model B that's still under guarantee Tel Nottingham 202632

VIC20, 3K, tape deck, ADU cartridge software £160 ono Tel Hatfield 66426 (6 pm)

COMMODORE, 64 games arcade + educational + Super Lander price range from £2.95-7 95 Tel 01-450 4658

VIC20 tape deck, 3 tapes super expander 3 Rom games joysticks, mags 3 books etc £200 ono. Tel 01 739 9061 (anytime)

VIC20 will swap Adventureland cartridge for The Count or Pirates Cove Tel 051 356 3874

COMMODORE FOR SALE, Vic20 cassette unit, introduction to Basic part 1 books and some software £120 Tel 01-803 2881

VIC20 plus C2N cassette with 3K, 8K and 16K Ram pack, six games cartridges including Gorf programmer's aid super expander machine code monitor cartridges £150-worth of software Introduction to Basic 1 and 2 Vic revealed plus reference guide joystick and paddle all worth £707 still under guarantee Sell for £400 Tel 01-892 8766

VIC20, cassette unit three-slot motherboard 8K expansion machine code monitor cartridge over £300-worth of software including Jelly Monsters Sargon II Chess etc, joystick, books on home computing Basic and machine code program manuals worth £800 Sell for £400 ono or swap for BBC Model B plus software Wilson 21 Chanton Field Fulwood Preston, Lancs PR2 3WTH

Acorns for sale

ACORN ATOM, 12 Ram 15K Rom including floating point and toolbox tapes, books + listings, power supply + all leads £180 ono Oxted 4618

ACORN ATOM, 12K Rom + 12K Ram + VTA tape recorder + leads manual, etc, very good condition, £115 ono Tel Northwood 21485

BBC MODEL B Tel Tiverton 256412

ACORN ATOM, 12K Rom, + 15K Ram utility gear Ram manuals, + magic sole games pack, + software, £140 ono Tel 01-863 8009

BBC MODEL B, two months old, £380 including Acorn software, + books. Tel. Camberley 33780

BBC B with disc interface single disc drive micro-Vic deck monitor Ferguson cassette recorder Tandy full tractor printer and cable 2 joysticks plus assorted software £1 000 ono Buyer collects. Tel Littlewick Green 5207

ACORN ATOM, 12+12 chess game and power supply £80 Tel Ripley (Derbyshire) 48870

Ataris for sale

ATARI VCS 3 cartridges including Space Invaders Chess, Night Driver + Maze-Craze, £135 Tel 0869 47583 (Steeple Aston) Oxford area

ATARI VCS In excellent condition + 7 cartridges including Space Invaders Missile Command Star Raiders Worth £280 will accept £170 Tel Guildford 38560 evenings or weekends.

ATARI video computer system and cartridges + Combat Defender Asteroids Space Invaders and Breakout Any offers. Tel 501 2274

ATARI VCS, 9 cartridges including Defender Pacman and Missile Command 9 months old £130 or swap for Spectrum Telephone Bracknell 23443

ATARI 400 16K + basic + recorder + typewriter keyboard software Miner Shamless Sub Commander etc Also books + magazines £150 Tel 01 204 2804

ATARI 400 48K with tape recorder joystick and lots of software guaranteed £550 ono Tel 74139

ATARI 40 958 + disc drive + a lot of software £1 000 sell for £800 ono Tel 858 3969

ATARI 800 + cassette 3-game Pacman centipede 1 star raiders some books £450 Tel 908 3889 Mr Robinson

ATARI VCS + 5 cartridges to swap for any home computer Tel 01-848 0630 anytime

ATARI VCS + 15 cartridges including soccer space invaders basic program + chess Total cost £450 accept £210 ono Tel 01 958 7394

ATARI VCS, 4 cartridges including Space Invaders + Asteroids £100 ono Tel Hatfield 63026

ATARI VCS 4 cartridges including Demon Attack £75 ono Tel 460 4109

ATARI VCS, + 5 cartridges worth over £100 sell £70 Warrington 811979

ATARI 800 WICO, joystick games cartridge basic programmer kit 2 months old registered guaranteed £230 ono Tel Luton 584238

ATARI 400, 48K Basic cassette joysticks + games worth £200 £295 Tel 0702 201637

ATARI VCS GAMES COMPUTER, 5 cartridges excellent condition £120 ono Tel 01-648 0530 anytime

ATARI VCS, as new with 2 games £90 Tel 0432 74582

ATARI 400 SOFTWARE swap Submarine Commander for Jumbo Jet Pilot Tel 01-858 2845 after 5 pm

ATARI VCS Video Chess plus Pacman mint condition boxed as new £90 Tel 348 5866.

ATARI VCS plus five cartridges including Missile Command Space Invaders etc £120 ono or swap for ZX Spectrum Tel Odiham 3445 after 4 pm

ATARI VCS, as new boxed with joysticks paddles Combat, Defender Berserk Empire Strikes Unwanted gift £95. Tel 01-651 3663 after 4 pm

ATARI VCS plus 17 cartridges offers over £200 Tel Lodge Hill 41849

Tandys for sale

TANDY TRS 80 16K model 1 level 2 in good condition + £70 monitor £25 cassette recorder + over £100 of software + manuals total value £500 sell for £200 ono Tel Abingdon 25865 after 4 pm

TANDY TRS 80 MODEL 1 level 2 16K only 3 months old over £270 of software sound box amplifier lowest manuals price £200 Tel 021-7053469

32K COLOUR TANDY joystick case CCR tape recorder software + hardware + books etc cost over £670 3 months old accept £450 ono Tel 061 570 2182.

FOR SALE TANDY TSRS 80, level 2, 16K entire new £150 or swap for 16K Spectrum Tel 021 353 3298 after 8 pm

TRS 80 16K level 2 including dust cover monitor cassette recorder software books and manuals £220 Tel Coventry (0203) 604485 after 5 pm

For sale

SWAP OR SELL 30 Spectrum programmes Tel Whitham 518470

ORIC 1 48K, with full manual + cassette lead unwanted gift, £150 Tel Rugeley 8877

MISSION IMPOSSIBLE adventure for Vic20 £15 Panic Vic20 £3 Tel 509 9684

SHARP MZ 80K 2 Basic tapes and assembler tape + software £345 ono Tel 550 5272

VIC CARTRIDGES mostly half price, also books Tel 574 4122

DRAGON 32 Tensai cassette recorder Tandy joysticks, several cassettes London delivery possible £185 Southend (STD 0202) 337336

RECORD PLAYER swap for BBC software Tel 0525 370458

SHARP MZ 80K with dust cover re-set button large amount of software + languages inc assemble Forth machine code Scramble Defender Chess etc £350 ono Tel Poynton 873084

TEXAS TI99/4A with extended Basic plus speech synthesiser and cassette with leads 3 months old Parsec game and wide selection of programs, £260 Tel Heywood (Manchester) 624 219

VIC ROADRACE CARTRIDGE + Amec + Cosmask + Ferguson cassette recorder (not for Vic) £30 Tel Worthing 202074

SWAP GRAND STAND, Astro Wars games with power adaptor for Vic20 software or super expander Tel 969 1207

LINKS 48K, 5 weeks old £175 Tel 0785 814738 Stafford

COMMODORE GAMES up to £5 depending on game Tel 501 2274

SWAP OR SELL, Spectrum software programs included Invaders Scramble Centipede etc Tel 01-864 2684 evenings Ask for Omer

ADVENTURE LAND for any other adventure in this series Tel 0341 280726

SPECTRUM SOFTWARE for sale or swap Pmania, £7 Arcadia, £4 Winged Avenger £3 Hobbit, £12 Time Gate Spectres, Black Crystal etc all originals Tel (0625) 2514 evenings.

SWAP ADVENTURE LAND for any other adventure cartridge Tel 01 302 3582.

JUPITER ACE complete with leads power supply + manual £58 Tel Toddington (Beds) 2470

EXCHANGE your software with me Send an sae to M A Valentine 101A Underdale Road Monk Moor Shrewsbury Shropshire SY2 5EF

SWAP VIC20 Pirate Cove adventure cartridge for the Count. Tel 0670 470362

SHARP MZ80K 48K RAM RTT Y interface various software + manuals £320 ono Tel Atherton 0924 891180

16K ZX81 ASSEMBLER books + software £50 Tel 01 850 8551

PANASONIC VC8000 video games system + six cartridges £80 ono Tel Cirencester 860207

VIDEO MASTER CHESS CHAMPION 6 levels of play £30 Tel 01-267 6210

SWAP PIRATE COVE for Golf or Sargon 2 chess. Tel 0606 77446

ZX PRINTER, new unwanted gift + QS time gate + Flight Simulation + Scramble + Centipede + Battle of Britain £75 Tel Hornchurch 71793

VIC20 cartridges, Tel 08656 38864 ask for Joel

SHARP MZ80A including manual and £100 of software Good condition £375 ono Tel 0202 512681 evenings

SOFTWARE for 16K or 8K Spectrum — TCM 1 solves cubic quartic and quadratic equations with real coefficients TSM 1 same written as subroutines £5-£25 Tel 01-298 2424

ATOM 12K + 12K, floating point tape recorder £70 of software Defender, Pac-Man Asteroid G C £200 ono Tel Shoreham 8254 (anytime)

PHILIPS T7000 for sale £50 Tel 699 9604 — buyer to collect.

MX80 ST Type 3 printer with cable paper and dust cover £310 ono Foad Kalan Tel 01 958 6707 (evenings)

SWAP VIC 20 GOLF for Vicmen Tel Worthing 202074

VICMEN CASSETTE, best offer to T Sarel 8 Nevill Road Uckfield East Sussex TN2 1PQ

DRAGON 32 little used mint condition in original box £170 Also £100-worth of paddles auxiliaries and software sell for £70 or £220 the lot Tel Farmingham 864929

PIRATE COVE adventure game for Vic swap for Sargon 2 Chess. Tel 508 2684

OMEGA RACE for Vic20, £18 to £20 Staina 53753,

FIDELITY VOICE SENSORY CHESS CHALLENGER + case perfect condition few months old cost new £300 accept £100 for urgent Tel 01-600 1200 ext 274 (day) 01-888 2684 (evenings)

VIDEO GENIE 16K RAM, integral cassette recorder monitor manual leads + some software offers around £100 Tel Crayford 526119

ITT 20-60 + 48K + green VDU disc unit, fully compatible with Apple II hardware and software £475 Tel Guildford 68095

ALL POPULAR VIC20 GAMES, all originals Tel 955 1207

ATARI VCS CARTRIDGES, as new with instructions Missile Command £15 Night Driver £12, Space Invaders £12, Lazer Blast £9 Tel 096 22254

VIC music composer cartridge £15 Alien cartridge £15 Syper expander £25 2 tapes Vic writer strategic advance to run them you need 16K memory £15 Tel 760 5278

TI99 4a with 2 games cartridges + joysticks £165 Tel 958 9020

FOR SALE Golf £5 Colonel's House adventure £5 Tel 0242 513450

EXCHANGE your software with me Send an SAE to M Valentine 101A Underdale Road Monkmoor Shrewsbury Shropshire SY2 5EF

GAMES for Vic20 Tracks Andes Attack Bonzo Miriad Night Crusader and others will be willing to swap for others Tel 955 1207

FIVE SPECTRUM machine games £15 Tel Leeds 0532 672122.

PC-100C printer as new £95 Structural engineering module for TI58 and TI59 Texas programmable calculators unused £20 all supplied in original boxes Tel St Albans 32089 or Fairbourne 558

2001 PET intergrown cassette deck 32K new Roms sound manual books dust cover over £100 software. £290 ono Tel 0924 823526

CHESS CHAMPION. Mark 1. £30 ono Tel 051-608 9567

VIC20 adventure cartridges, Pirates Cove + Mission Impossible £17 each or £30 together Tel 01 574 4122

TI99 4A with new accessories cassette lead + remote controllers + 3 games on cassettes + extra leaflets £150 Tel 800 1651

SHARP PC1500 with 5-colour computer printer and cassette interface with all leads + manual + case as new £200 ono Tel Winscombe 2622.

SWAP SPECTRUM original arcade games for other original cassettes Tel 06645 96657 (evenings Richard)

SHARP PC1500 + 8K Ram + 4-colour printer plotter hardly used £375 Tel. 464 0845

TANDY COLOUR 5 games written in basic learn programming techniques All programmes require 16K or 32K extending basic £5 including Lander and Ladder Chaser also Bedlam adventure to swap for other Tandy colour adventure not ??????? details on either Tel Mark Pal (0822) 661518

VIC20 Sargon Chess swap for any adventure cartridge Tel Edenbridge 863572

Wanted

TWO ALIEN 400s 16K Ram and no basic Tel 0703 39642 (Southampton)

ZX SPECTRUM 16K lowest price please and software. Tel Merstham 2824

WANTED Spectrum, exchange Olympus OM/MN + 60 — 2.10 zoom mint condition. worth £230 or bbc ELO guitar as new worth £100 + cash. Canterbury 69334 (Paul).

BBC Model A or B must be under guarantee Tel Maidstone 53710

ZX PRINTER + paper in exchange for Imperial portable typewriter + solar powered calculator + tape of assorted Spectrum programs. Call at 34 West Hill Road Herne Bay Kent anytime

BBC A ON B part exchange for Apple II plus 48K (£500) Tel 0273 508311

WANTED COLOUR MONITOR £125-£150 Tel 01 788 8963 (8 pm)

BBC MODEL A OR B. Tel Broadstone 694333

DRAGON 32 or BBC computer Tel. 0335 44148

64 RAM for Vic20 will swap for 15 well known games Tel 01-579 2129

WANTED BBC MODEL B Manchester area Phone 061-884 5023

FELLOW for unexpanded Vic20 Tel Banbury 720640 after 4.30 pm.

SPECTRUM WANTED Good price offered for latest model preferably 48K Tel 01-574 4936

4K ZX80 with or without memory expansion Tel 04862 70150

DRAGON COMPUTER, 32K, all manuals + cables includes T V £150 Ley Godwin Flat 1 Tel 01-373 8068

C2N CASSETTE DECK, for Vic20 Tel 021 5253332

WANTED, BBC Model B Tel Croydon 01-684 3269

WANTED Atom or Vic for £95. Tel 01 584 1164 (8 pm)

WANTED 16K SPECTRUM, reasonable price paid Tel Coventry 469181

AMATEUR SOFTWARE WRITERS needed for the BBC Tel 958 9442

WANTED ZX80 complete in original box with manual etc Tel Northleach 25240

VIC20 plus cassette unit, £100-£200 Tel Woking (0462) 70316



LINKED UP NETWORK

Ruth Selby of York, writes

Q **I have a Vic20 and I am getting on quite well when it comes to learning how to program. I have seen a number of advertisements and articles mentioning Micronet, a system for linking up ordinary home computers to a Prestel network, that will carry programs for the home user. It seems that it can be used with the Sinclair computers and some others.**

What others? Could you please give me some more details, especially about the Vic20?

A Micronet has a policy of steadily adding new computers to the Micronet system. It is a telephone accessed database and each computer will need its own modem and decoding software. It is planned to bring the Vic20 on line in July this year. The Commodore 64 will also be bought on line later this year

WHICH COMPUTER?

Gary Wilson of Wilford Gardens Chelsea SW3, writes

Q **I am thinking of buying a computer, but am not sure which one to buy. The two which interest me are the BBC model B and the Atari 800 (48K). I am not only interested in games, but learning to program in Basic and Machine code as well. Please could you give me some idea of the capabilities of these machines.**

A You have chosen two machines that are very much in the same corner of the market and are now in a similar price range. The Atari will give you more user memory and its excellent graphics are well known. The BBC is generally considered to be able to mount at least a challenge to the Atari on the graphics front though it does not have quite the same variations of colour. Neither will the BBC have as much Ram free for your own use.

On the other hand, the BBC is probably the best micro under £500 when it comes to additions to the system, including the potential of the 'tube' by which a second processor can be added. There will be more potential to build a complete system around the BBC.

The question of support is fraught with difficulties and cannot easily be dealt with here. Firstly, if you are at school, then the BBC is one of the most common computers chosen under the D I scheme. A lot of independent companies are making software for it, and the software tends to be cheaper than comparable Atari programs.

What it comes down to is looking not only at the computers, but at what is available for them, and the overall cost. Also work out as far as possible how much you want to develop your system.

CHEAPER AND EASIER?

R Baker of Goole in Humberside, writes

Q **I have been working through Toni Baker's book *Mastering Machine Code on your ZX81* and find it excellent. I would like to know if there is a book available that will give the Z80 instruction set. I know of the Rodney Zak book, but I wonder if there is anything cheaper and more straight forward?**

A Though Rodney Zak's tome is very much a standard work, I can understand people struggling in places. I can also appreciate your reluctance in paying £12 for a book that is difficult to comprehend.

However, cheaper alternatives do not readily spring to mind, with the exception of an excellent little book that perversely seems to be very difficult to find. The *Z80 Instruction Handbook* is by Nat Wadsworth and is published by Scelbi. I have no ISBN number in my copy nor a library of congress catalogue number.

Georges do not have it listed in their catalogue and I do not think that Foyles have any more copies — as I said, the book is elusive. There is at least one in the library system, or you might try contacting Scelbi direct. The address is 20 Hurlbut Street, Elmwood, Illinois, CT06110, USA. Good luck.

ORIC QUESTIONS

C Dawson of Buttermere Drive, Allestree, Derby, writes

Q **I am thinking of buying an Oric 1. Having read some recent reviews, the following questions come to mind. It appears that the Oric will be able to accept Telesoft programs — does this mean that it will be able to download programs from Ceefax?**

Since Telesoft is designed for the BBC micro, will the BBC programs be compatible with the Oric 1 (entered as listings or from tape)? Also, will *Popular Computing Weekly* be publishing programs for the Oric?

A The Oric was designed to download Prestel through its own modem — unfortunately this modem seems to have been 'delayed'.

To download Ceefax, a special adaptor will be needed and I do not know if one is yet available for the Oric.

At least Ceefax now has a standard, set by the CET (Council for Education Technology). This means that you will need a standard Ceefax adaptor, plus special software to decode the input into the Oric's own dialect of Basic. Again, I do not know if this is being done.

The Oric cannot *Load* BBC programs and a BBC program would have to be translated from the Oric's microsoft version of Basic to the BBC's lookalike version.

We are always on the look out for good programs, whatever the computer. Interest in the Oric is growing and I hope that good material will be available soon.

SPECTRUM PRINTERS

Cameron South of West Hill Road, Dartford, Kent, writes

Q **I wonder if you can help me. I would like to buy a colour printer for my ZX Spectrum (48K). Will the Tandy graphic colour printer CGP-115 be compatible? Will Tandy supply an interface for use with my Spectrum? Do you know how reliable it is and where I can contact the dealers?**

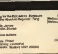
I am not an electronic expert and I would appreciate any other advice you have about printers and prices for the Spectrum.

A The Tandy colour graphic printer is certainly an important addition to the range of printers available at the lower end of the market. The CGP-115 will not be directly compatible with the Spectrum, as the Spectrum does not have either a Centronics, or an RS 232 interface.

However, Soptest, 10 Richmond Lane, Romsey, *Hants*, has developed a package which enables the Spectrum to run the CGP-115. The package costs £35 and includes both connector and software to run the system. For further details see News Desk, March 31-April 6.

Is there anything about your computer you don't understand, and which everyone else seems to take for granted? Whatever your problem *Peek* it to Ian Beardsmore and every week he will *Poke* back as many answers as he can. The address is *Peek & Poke, PCW*, Hobhouse Court, 19 Whitcomb Street, London WC2 7HF.

Top 10



Books

1	(2)	Assembly Language Programming for the BBC Micro *Birnbaum*	(Macmillan)
2	(4)	Spectrum Machine Language for the Absolute Beginner *Tang*	(Melbourne House)
3	(3)	Enter the Dragon *Carter*	(Melbourne House)
4	(1)	The BBC Micro — An Expert Guide *James*	(Granada)
5	(8)	Introducing Spectrum Machine Code, *Sinclair*	(Granada)
6	(—)	Programming the 6502 *Zaks*	(Sybex)
7	(16)	Compute!'s First Book of Vic *various authors*	(Compute!)
8	(—)	The Complete Forth *Winfield*	(Sigma)
9	(9)	Vic Programmer's Reference Guide *Finkel*	(Commodore)
10	(—)	Z80 Assembly Language Programming *Leventhal*	(Osborne)

(Figures compiled by Watford Technical Books, Watford 0922 23004)
(Last week's positions in brackets)

Ziggurat

Sweet and Sour

Some American psychologists have developed a technique to quantify a human response called the method of "semantic differentials".

A semantic differential is a bipolar scale such as 'hot ... cold' 'big ... small' or 'expensive ... cheap' applied to a set of concepts. A concept can be an object such as "the Mini Metro", or an idea such as "justice", and the same scales are used for a whole series of concepts.

The psychologists found that people were quite willing to engage in this exercise, to the extent that they were willing to rate "boulders" (ie. big rocks) on scales such as "sweet ... sour". That is, people were able to rate boulders as more sour than sweet without being too sour. When I see some reviews of software, or hardware, I think of the boulder being sweet or sour, or scoring 5 7 on the sweet ... sour scale (very sweet=1, very sour=7).

Take, for example, a list of different computers by price. The list has a large number of categories, such as "memory", "languages", and such like — with some useful information within the categories. The final category is "ratings", where the sub-categories are "games", "business", "scientific", "program", and "overall". Each sub-category has a number from 1 to 10. One series of numbers is 3 5 4 4, with 4 being the score for the overall rating, another series is 4 6,4 4, still with an overall score of 4, yet one with 2,6,3,4 has an overall score of 5.

Numbers are used because they give a touch of (non-existent) objectiveness to the whole exercise.

In fact, they say no more (perhaps less) than good old-fashioned "excellent" or "terrible". The compilers of the list are trying to quantify the unquantifiable, because numbers seem to carry greater weight than words — they appear more professional.

In another example (from a different source) games could be rated on a percentage basis and given an overall stars rating. The variation in the use of stars seemed to indicate that the most popular classification was four stars. Why not just say "very good"?

I am very interested in words, and I found the written commentary to be at variance with the percentages, which themselves seemed to have little relationship with the star appraisal.

The fascination with numbers has also extended to advertisers. I have seen one which proudly claims that this certain program had the greatest combined score (the review had several scales, all marks out of 5) for programs of that type.

This is a bit like saying, I have three marbles in my pocket and two pound notes so I have more than you — because you only have one marble and three pound notes. To score 6 by getting 4 for enjoyment and 2 for ease of loading is not the same as scoring 6 by getting 1 for enjoyment and 5 marks for ease of loading.

The evaluation of software requires rather more sophistication than that.

So I have developed my own evaluation system (which is mine and belongs to me) — called the CO4 criteria. The criteria are Communication (how the user and program interact), Computation (how does the program do what it does and should it?), Co-ordination (how do the various parts of the program relate?) and finally Constitution (does it make sense?). More of this next week.

Boris Allen

Puzzle

Back to front!

Puzzle No 51

102564

This is an interesting number. Moving the final digit — 4 — from the end of the number to the front the result is exactly four times as big.

4 × 102564 = 410256

This is the smallest number with this property.

Can you find the *lowest* number that ends in a '9 which becomes nine times as big if the figure is removed from the end and placed at the beginning.

Solution to Puzzle No 46

As we are told that zero is not used, we need to find a 3-digit number that has a 6-digit square in which all the nine digits involved are different.

The numbers between 317 and 999 are tested sequentially for this property

```
10 FOR N = 317 TO 999
20 LET M = N * N
30 LET N$ = STR$ N + STR$ M
40 FOR A = 1 TO 8
50 FOR B = A + 1 TO 9
60 IF N$(A) = N$(B) OR N$(A) = "0" OR N$(B) =
   "0" THEN GOTO 100
70 NEXT B
80 NEXT A
90 PRINT N, N * N
100 NEXT N
```

This gives the results 567 or 854

Winner of Puzzle No 46

The winner is: Martin McKeown, Carnvue Gardens, Carnmoney, Newtownabbey, Co Antrim, Northern Ireland

Top 10

Dragon

1	(1)	Donkey King	(Microdeal)
2	(7)	Katerpillar Attack	(Microdeal)
3	(2)	Dragon Trek	(Salamander)
4	(3)	Planet Invasion	(Microdeal)
5	(8)	Champions	(Peaksoft)
6	(6)	Space Race	(Compusense)
7	(5)	Attack	(PSS)
8	(4)	[illegible] II	(Microdeal)
9	(9)	Pimania	(Automata)
10	(—)	Wizard War	(Salamander)

(Figures compiled by Dragon Dungeon, Ashbourne 0335 44626)

Vic-20

1	(1)	Star Runner	(Llamasoft)
2	(2)	Laser Zone	(Llamasoft)†
3	(8)	Scramble	(Rabbit)
4	(5)	Colonel's House	(Rabbit)‡
5	(4)	Sargon II Chess	(Commodore)*
6	(3)	Avenger	(Commodore)
7	(6)	Andes Attack	(Llamasoft)†
8	(7)	Hopper	(Rabbit)
9	(10)	Alien Attack	(Interceptor Micros)
10	(—)	Road Race	(Commodore)*

*Cartridge. †Requires 8K or 16K. ‡16K only

(Figures compiled by Vic Centre, London 01 868 9384)

Spectrum

1	(10)	Black Crystal	(Carnell)
2	(—)	Galaxians	(Artic)
3	(6)	Compiler	(Softek)
4	(2)	The Hobbit	(Melbourne House)
5	(—)	Do Not Pass Go	(Workforce)
6	(8)	Flight Simulation	(Psion)*
7	(—)	Football Manager	(Addictive Games)
8	(5)	Knight's Quest	(Phipps Associates)
9	(4)	F[illegible]	(A+F)
10	(—)	Centipede	(DK'Tronics)

*Requires 48K.

(Figures compiled by Buffer Micro Shop, London 01 769 2887)

Atari

1	(1)	Zaxxon	(Datasoft)
2	(4)	Floyd of the Jungle	(Microprose)§
3	(—)	Preppie	(Adventure International)
4	(2)	Defender	(Atari)*
5	(6)	Astro Chase	(First Star)‡
6	(—)	Pac-Man	(Atari)*
7	(3)	Eliminator	(Adventure International)
8	(8)	Star Dragon	(Adventure International)
9	(—)	Shamus	(Synapse)
10	(—)	Ali Baba and the 40 Thieves	(Quality Software)§

*Cartridge. ‡32K cassette. §32K disc.

(Figures compiled by Calisto Computers, Birmingham 021-632 6458)

ZX81*

1	(2)	Galaxians	(Artic)
2	(—)	3D Crystal	(Carnell)
3	(10)	Kong/Dracula	(Tony Roberts)
4	(6)	Froggy	(DJL)
5	(8)	Trader	(Pixel)
6	(5)	Do Not Pass Go	(Workforce)
7	(7)	Gauntlet	(Coloursmatic)
8	(—)	Invasion Force	(Artic)
9	(9)	Gulp 2	(Campbell Systems)
10	(3)	Chess II	(Artic)

*All 16K.

(Figures compiled by Buffer Micro Shop, London 01 769 2887)

BBC*

1	(1)	Rocket Raid	(Acornsoft)
2	(4)	Snapper	(Acornsoft)
3	(5)	Meteors	(Acornsoft)
4	(—)	[illegible]	(Acornsoft)
5	(—)	Sphinx Adventure	(Acornsoft)
6	(2)	Creative Graphics	(Acornsoft)
7	(—)	Arcadians	(Acornsoft)
8	(—)	Chess	(Computer Concepts)
9	(—)	Castle of Riddles	(Acornsoft)
10	(—)	Lisp	(Acornsoft)

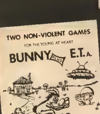
*All Model B.

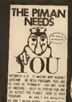
(Figures compiled by Micro Management, Ipswich 0473 59181)

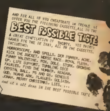
[Last week's compiled in brackets]



AUTOMATA U.K. Ltd PRESENTS







AUTOMATA ..."we put some TING in computing"

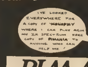
Attention all doodlerz, dealerz & dezignerz!
TRY THESE HI-RES GRAPHICS PROGRAMS

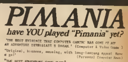
DRAGON DOODLES & DEMOS

A PACK OF BRILLIANT AUTOMATIC DEMONSTRATION PROGRAMS PERFECT FOR THE HOME & TRADE ALIKE *plus* SELF-TEACHING GRAPHICS DESIGNING AND DRAWING PROGRAM COMPLETE WITH SIMPLE FULL INSTRUCTIONS

SPECTRUM SPECTACULAR

THE SELF-TEACHING USER-DEFINED GRAPHICS PROGRAM *plus* A BUILT-IN LIBRARY OF READY-MADE SYMBOLS *including* GREEK RUSSIAN HEBREW ARABIC, MATHS CHESS, FOOTBALL INVADERS PACMAN FROGGER, AND HUNDREDS MORE all at the touch of a key.





"THE BEST EVIDENCE THAT COMPUTER GAMING HAS COME OF AGE AN ADVENTURE ENTHUSIAST'S DREAM." (Computer & Video Games)

"Original, bizarre, amusing, with long-lasting appeal. Have a go!" (Personal Computer News)

"THE BEST ADVENTURE GAME EVER"........ ..... (STREETLIFE)

"At last a refreshing alternative to death and destruction You are hooked right from the start" (Which Micro)

"AWARD GOES TO AUTOMATA ..A NEW SOFTWARE CONCEPT WITH GLITTERING PRIZES" (P C W)

"Addictive madness, very professional, the Ultimate Quest, an absolute must!" (Dragon's Teeth)

"THE COMPLETE ENTERTAINMENTS PACKAGE." THE BEST ADVENTURE GAME REVIEWED FOR VALUE & PLAYABILITY (CVG BOOK OF REVIEWS)

'I have been reduced to a gibbering "PIMANIAC" by a crazy cartoon character called THE PI MAN (Interface)

"INSANE' BEAUTIFUL MONTY PYTHON MEETS MASQUERADE!" (PCW)

"All-singing, all dancing, with clever moving graphics good sound effects and a large number of tunes." (ZX Computing)

'IT COULD TAKE A WEEK ... IT WILL PROBABLY TAKE YOU A LIFETIME!" (Electronics & Computing)

"PIMANIA...THE BEST ADVENTURE GAME WE HAVE EVER REVIEWED." (SINCLAIR USER)



£6,000 PRIZE!

Includes free hit single by Clair Sinclive and the Pi Men

NO-ONE HAS WON "PIMANIA"......YET

AAW! IS THIS THE LAST PAGE?

ALL PRICES INCLUDE VAT, PACKING & POSTAGE, WITHIN THE U.K. ENQUIRIES FROM OVERSEAS AND DEALERS ARE VERY WELCOME... please send me these cassettes. I enclose the right amount

MY NAME ....

MY ADDRESS ....

....

.... POST CODE ....

PIMANIA	ZX81 (16K)	£5	No	£
PIMANIA	SPECTRUM(48K)	£10		
PIMANIA	DRAGON 32	£10		
PIMANIA	BBC (32K)	£10		
DRAGON DOODLES & DEMOS + SPECTRUM SPECTACULAR	DRAGON 32 any SPECTRUM	£6		
BUNNY plus E T A	any SPECTRUM	£8		
THE BEST POSSIBLE TASTE	ZX81 (1K)	£5		
		TOTAL		£

send cash, cheques, POs to AUTOMATA UK Ltd (P) 65 OSBORNE RD. PORTSMOUTH, PO5 3LR. ENGLAND. TEL (0705) 735242

(cut this out or send as a note if you prefer not to massacre your magazine ... and thanks for your custom.)